1 of 100 DOCUMENTS

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PUBLIC NOTICE

ENVIRONMENTAL PROTECTION
DIVISION OF WATERSHED MANAGEMENT

32 N.J.R. 2132(b)

ADOPTION OF THE AMENDMENT TO THE NORTHEAST WATER QUALITY MANAGEMENT PLAN TO ESTABLISH A TOTAL MAXIMUM DAILY LOAD FOR FECAL COLIFORM AND AN INTERIM TOTAL PHOSPHORUS REDUCTION PLAN IN THE WHIPPANY RIVER

PUBLIC NOTICE

Take notice that on April 16, 2000, pursuant to the provisions of the New Jersey Water Quality Planning Act, *N.J.S.A. 58:11A-1* et seq., and the Statewide Water Quality Management Planning Rules (*N.J.A.C. 7:15-3.4*), an amendment to the Northeast Water Quality Management Plan was adopted by the Department of Environmental Protection (Department). This amendment established a total maximum daily load for fecal coliform as well as interim phosphorus reduction measures in the Whippany River Watershed. This amendment implements the requirements of the US Environmental Protection Agency's Water Quality Planning and Management Regulations (40 CFR 130) to establish total maximum daily loads for all water quality impaired waterbodies.

Total Maximum Daily Loads (TMDLs) represent the assimilative or carrying capacity of the receiving water taking into consideration point and nonpoint sources of pollution, as well as surface water withdrawals. A TMDL is developed as a mechanism for identifying all the contributors to surface water quality impacts and setting goals for load reductions for specific pollutants as necessary to meet surface water quality standards. TMDLs are required, under Section 303(d) of the Federal Clean Water Act, to be developed for waterbodies that cannot meet water quality standards after the implementation of technology-based effluent limitations. TMDLs may also be established to help maintain or improve water quality in waters that are not impaired. A TMDL establishes waste load allocations and load allocations for point and nonpoint sources, respectively. Regulations concerning TMDLs are contained in EPA's Water Quality Planning and Management Regulations (40 CFR 130).

Where TMDLs are required to address documented surface water quality impairment, such changes are to be made to the varying sources contributing to the water quality problem in order to reduce the total pollutant load received by the waterbody. Load reduction goals established through TMDLs are achieved through the issuance of wasteload

allocations (WLAs) for points source discharges, load allocations (LAs) for nonpoint source discharges, and a margin of safety. Since nonpoint source pollution, by definition, does not come from discrete, identifiable sources, load allocations would consist of the identification of categories of nonpoint sources that contribute to the parameters of concern. The load allocation would also include specific load reduction measures for those categories of sources, to be implemented through best management practices (BMPs) including local ordinances for stormwater management and nonpoint source pollution control, headwaters protection practices, or other mechanisms for addressing the priority issues of concern.

In May 1999, the New Jersey Department of Environmental Protection (Department) and USEPA Region 2 entered into a Memorandum of Agreement (MOA) including an eight-year schedule to produce TMDLs for all water quality limited segments remaining on the 1998 Section 303(d) List of Water Quality Limited Waterbodies in New Jersey. This TMDL for the Whippany River Watershed is the first to be developed under this MOA. The TMDL will also be included in the Whippany River Watershed Management Plan when it is published in Spring 2000. The purpose of the Whippany River Watershed Management Plan is to advance measurable goals, objectives and strategies to restore, enhance and protect the Whippany River Watershed so that it can be maintained as a viable and valuable resource for present and future generations.

The Department is publishing this notice of adoption of an amendment to the Northeast Water Quality Management Plan pursuant to *N.J.A.C. 7:15-3.4*. A complete TMDL report follows this notice and explains the development and substantive requirements of the fecal coliform TMDL for the Whippany River Watershed and the interim total phosphorus reduction plan. The proposed amendment was published August 2, 1999 at *31 N.J.R. 2263(a)*. A summary of comments and responses related to the proposed amendment follows. The amendment (including the fecal coliform TMDL, the interim load reduction plan for total phosphorus, and the response to comments) was submitted to USEPA pursuant to N.J.A.C. 7:15-7.2(k) and the MOA on December 30, 1999 for formal review in accordance with *40 CFR 130.7*. On February 24, 2000, USEPA issued its approval of the fecal coliform TMDL.

While there are slight changes from the proposed amendment, the adopted amendment is not substantively different from the proposed version. The adopted amendment retains: an implementation plan for reducing fecal coliform loads to the Whippany River; an interim plan to prevent increases in phosphorus loads to the Whippany River in anticipation of the Passaic River TMDL due in June 2002; and information and data supporting the Department's intention to de-list the Whippany River with respect to Dissolved Oxygen. In response to USEPA's review, the amendment was modified on adoption to include a more rigorous quantification of fecal coliform load reductions and change in title of the phosphorus reduction plan from a "Phased 1 TMDL" to an "Interim Phosphorus Reduction Plan." However, the implementation plans for both fecal coliform and total phosphorus reductions have not been modified. Therefore, the Department has determined that no significant changes requiring additional public comment were made.

In addition to the nonpoint sources of pollution described in the following TMDL report, the point source dischargers identified below will be affected by this amendment since it also establishes requirements for an interim total phosphorus reduction plan in the Whippany River Watershed. Only these municipal dischargers are affected because they comprise the vast majority of phosphorus point source load to the Whippany River.

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Whippany River Watershed Municipal Dischargers

NJPDES #	FACILITY NAME	Municipalities	RECEIVING STREAM
NJ0024902	Hanover SA 1	Hanover Township	Whippany River
NJ0024911	Morris Twp--Butter worth	Morris Township	Whippany River
NJ0024970	Parsippany-Troy	Parsippany-Troy	Whippany River

	Hills SA 2	Hills	
NJ0025496	Morristown Town STP 3	Town of Morristown	Whippany River
NJ0026689	NJDHS--Greystone Psych Hosp 4	Morris Township	Whippany River
NJ0026751	Saint Mary's Abbey 5	Morris Township	trib to Whippany River

. . .

1 Hanover S.A. is currently implementing the interim total phosphorus reduction plan via the January 20, 2000 Settlement Agreement with the Department.

2 TMDL calculation did not include this facility because it discharges at the extreme downstream point in the watershed and was not included in the model domain.

3 According to the Department's Division of Water Quality, Morristown, via a treatment plant upgrade, has brought their plant into compliance with their 1.0 mg/l phosphorous permitted effluent limitation and as such is not subject to any of the requirements of this plan.

4 Greystone is scheduled to cease discharge; therefore an existing effluent equivalent calculation is not necessary for this sewage treatment plant.

5 On December 31, 1994, an administrative consent order (ACO) was signed by the Department and by the owners/operators of the St. Mary's Abbey--Delbarton School Sewage Treatment Plant (STP). That ACO provides for either the construction of a sewer extension to convey all wastewater generated by the STP to the Township of Morris Butterworth STP or upgrade the existing STP to meet final effluent limitation of the associated NJPDES Discharge Permit. The owners/operators of the STP have chosen to convey their wastewater to the Butterworth STP. The ACO includes an enforcement construction compliance schedule for construction of the conveyance system as well as a requirement by the owner/operator to evaluate and provide the Department with a written report summarizing the efforts taken to reduce the use of phosphate containing cleaning/washing materials within the Delbarton School.

The proposed amendment was published in the New Jersey Register at *31 N.J.R. 2263(a)* on August 2, 1999. A public hearing was held on September 1, 1999. Comments on this amendment were received during the public comment period, including a public hearing, and are summarized below with the Department's responses. The administrative record for this amendment is available for public inspection by contacting the Department as follows:

Department of Environmental Protection
Office of Legal Affairs
401 E. State Street
PO Box 402
Trenton, New Jersey 08625-0402

Summary of Public Comments and Agency Responses:

The following people submitted written and/or oral comments on the proposal:

1. Jennifer Archibald, President, Whippany River Watershed Association

2. Mary Arnold, citizen (member of the Whippany Public Advisory Group)

3. James Cosgrove, Omni Environmental (member of the Whippany Public Advisory Group)

4. Abigail Fair, Association of New Jersey Environmental Commissions (member of the Whippany Public Advisory Group)

5. Ella Filippone, Executive Administrator, Passaic River Coalition (member of the Whippany Public Advisory Group)

6. Pat Kehrberger, HydroQual on behalf of the Warren Township Sewerage Authority (member of the Whippany Public Advisory Group)

7. Pat Matarazzo, Director of Verona STP, representing the Association of Environmental Authorities (member of the Whippany Public Advisory Group)

8. Russell Nerlick, Western Monmouth Utilities Authority

9. Jurek B. Patoczka, Killam & Assoc. on behalf of Morris Township Butterworth Plant

10. Lynn L. Siebert, President, The Bernam Park Association

11. Michael Wynne, Director of Hanover STP

A summary of the comments to the proposal, and the Department's responses to those comments, follows. The number(s) in brackets at the end of each comment corresponds to the commenter(s) listed above.

1. COMMENT: Commenters support the proposal and commend the Department for its approach to this TMDL. This TMDL is the first step in finishing the job started on the Whippany River in the 1970's by the Clean Water Act and will help reduce the total amount of pollution that both point and nonpoint sources contribute to the larger system on an annual mass balance basis. [2,5]

RESPONSE: The Department appreciates the commenters' support of the amendment.

2. COMMENT: The 61 dischargers in the Passaic River Basin Alliance agree that this TMDL is "something they can live with." The TMDL is scientifically the sound way to proceed. [7]

RESPONSE: The Department appreciates the commenters' support of the amendment.

3. COMMENT: Commenters support the proposal made by the Whippany Technical Advisory Committee that the existing phosphorus loadings in the Whippany River not be allowed to get worse. [4,5]

RESPONSE: The proposal referred to by the commenters relates to one of the planning goals of the soon-to-be published Whippany River Watershed Management Plan. The Department appreciates the commenters' support for this plan; however, it is not part of this amendment. The Interim Total Phosphorus Reduction Plan will be included in the Plan as one of the strategies for achieving water quality goals in the Whippany River Watershed.

4. COMMENT: Commenters oppose establishing a TMDL for phosphorus and oppose a conclusion that phosphorus is a problem because it is not scientifically sound. The Department should wait until a complete study and model is done before establishing the TMDL. It certainly cannot foster a good working relationship between the stakeholders in the Whippany Watershed. The commenter also noted that the generic phosphorus criterion was incorrectly referenced as 1.0 mg/l in the section entitled "Total Phosphorus Basis for Phased approach." [11]

RESPONSE: The Department agrees that a TMDL for Total Phosphorus should not be set at this time. Since the Department has determined that phosphorus is neither limiting primary production nor causing impairment to designated uses in the Whippany River, the numerical total phosphorus criterion does not apply in the Whippany River. In addition since there is no evidence of objectionable algal densities or nuisance aquatic vegetation in the Whippany River, there is no violation of the Nutrient Policy. Therefore, a TMDL for Total phosphorus is not required because the Whippany River is in compliance with the Surface Water Quality Standards with respect to phosphorus. It is expected that phosphorus controls may be required in the Whippany River and other tributaries to the Passaic River, as well as within the mainstem, as part of the TMDL for Total Phosphorus in the Passaic River in 2002. However, the extent and nature of those controls is not known at this time and can only be determined through the TMDL process. At this time, the Department is implementing interim phosphorus controls on municipal dischargers within the Whippany River Watershed, including the imposition of phosphorus concentration limits based on existing effluent quality and low cost phosphorus reduction methods. These restrictions will serve to minimize further phosphorus loads to the Passaic River while the TMDL is being developed. In addition, the implementation of the TMDL for fecal coliform in the Whippany River Watershed will provide a residual reduction in phosphorus contributions from nonpoint sources of bacterial pollution that also contribute phosphorus.

The commenter's reference to the 1.0 mg/L limit is correct. Due to a typographical error, the Department referred to the "generic stream criterion of 1.0 mg/L" instead of 0.1 mg/L. The Department apologizes for any confusion that may have resulted from the misprint.

5. COMMENT: The commenter questioned the timing and length of the public comment period and felt that insufficient opportunity was provided for public comment on the amendment. [11]

RESPONSE: The Department does not agree with the comment that insufficient opportunities were provided for public comment on this amendment. The public comment period and public hearing complied with the requirements for public notice and public participation for amendments to areawide water quality management plans and TMDLs pursuant to *N.J.A.C. 7:15-3.4* and 7.2. The public hearing was not required under these regulations but was held by the Department to provide additional opportunity for public comment due to the nature of the amendment, thus extending the public comment period an additional 15 days beyond the 30 days normally required. The public comment period and public hearing were in addition to the five-year process of working with the Whippany River Watershed Public Advisory Group (PAG) and Technical Advisory Committee (TAC). Both the TMDL and the Interim Total Phosphorus Reduction Plan reflect the results of the public participation through both the PAG and the TAC. PAG and TAC members represent the interested parties within the watershed community and each received copies of the proposed amendment and met on June 22, 1999 to discuss the amendment before it was published in the New Jersey Register in August.

6. COMMENT: Given the fact that the preliminary work to develop a TMDL for the Whippany took over six years, does the Department feel that a TMDL for the entire Passaic River Basin can be accomplished by the year 2002 Shouldn't more realistic guidelines be established [11]

RESPONSE: This comment does not pertain to the amendment. The six years mentioned by the commenter refers to the entire Whippany River Watershed Pilot Project--the Department's first effort to develop a comprehensive watershed management planning process. The TMDL in this amendment represents only one of many efforts undertaken as part of the pilot project; therefore the duration of the pilot project is not a good measure for determining the length of time required for developing a TMDL. The deadlines for establishing TMDLs in New Jersey were established through a Memorandum of Agreement (MoA) between USEPA, Region 2 and the Department that was executed on May 10, 1999. The MoA sets a date of June 30, 2002 for the Passaic TMDL to be established. The Department fully expects to meet that date.

7. COMMENT: Six months is too short a time period to evaluate the potential for low-cost phosphorus control alternatives and need instead to offer full scale pilot studies. [8]

RESPONSE: The Department does not agree with this comment. The Department has identified several low cost methods point source dischargers can examine to reduce phosphorus loads. Six months is an appropriate time to review the application of these methods to a particular discharger and establish an implementation scheme.

8. COMMENT: Commenter questioned why the DEP is calculating existing or seasonal effluent quality given the fact that monitoring and modeling results acknowledged that there were no objectionable algal densities and that streams were found to be suitable for their designated uses. [11]

9. COMMENT: Commenter suggested that while there is uncertainty about the status of phosphorus impairment due to the absence of eutrophication, the condition of the river should not be allowed to worsen. [5]

10. COMMENT: Commenter objected to allowing dischargers to maintain existing phosphorus concentration as their flows increase, since loading should remain the same or be reduced. It was noted that the TMDL proposal requires dischargers to come up with low-cost phosphorus reduction methods and identify them in a schedule to DEP, but commenters felt that this does not assure the maintenance or improvement of river quality. [4]

11. COMMENT: Commenters requested that DEP establish the strictest possible standards for sewage treatments plants and other pollution sources that discharge into the Whippany River to ensure water quality and the designated uses are protected. The upgrades of STP's should be performed now, not later, to reduce the phosphorus currently being sent downstream. [1,2,10]

RESPONSE TO COMMENTS 8 THROUGH 11: See Response to Comment 4.

12. COMMENT: Commenter questioned what percentage of the Passaic River's total phosphorus load is from the Whippany and whether or not the phosphorus load was causing adverse impacts in the Passaic [11]

RESPONSE: The comment is beyond the scope of this amendment. However, the Department has determined that phosphorus loading from the Whippany River must be quantified during the Passaic River TMDL development. The Passaic River TMDL is scheduled to be completed by June 30, 2002.

13. COMMENT: The commenter feels that the requirement of Existing Effluent Quality (EEQ) is unfair to wastewater dischargers if data to date show that nonpoint sources contribute half the total phosphorus problem. [11]

RESPONSE: The monitoring data provided through the Whippany Project show that 60 to 70 percent of the total annual nutrient loadings in the River is contributed by point sources. The Department agrees that a TMDL for Total Phosphorus should not be set at this time. Also, see response to Comment 4.

14. COMMENT: A concern was raised by several commenters that the Whippany EEQ approach for total phosphorus conflicts with an approach set forth in the proposed Phosphorus Settlement Agreement between the NJDEP and the Passaic River Basin Alliance members. Explain the rationale for this difference. [3,6,9,11]

RESPONSE: The Whippany EEQ approach is consistent with the phosphorus settlement agreement with eight municipal dischargers to which Comment 14 refers. Under both the settlement and the Whippany strategy, an EEQ using facility-specific data will be calculated and the permit modified to impose an EEQ phosphorus concentration.

15. COMMENT: For a facility that is expanding, the Phase I TMDL requires that a one mg/L total phosphorus limit be set. What is the technical justification for this one mg/L limit [11]

RESPONSE: A TMDL for total phosphorus in the Whippany River is not being established at this time. The one mg/L limit referred to by the commenter is based on the existing phosphorus effluent standard at N.J.A.C. 7:9-5.7(b) and is consistent with the settlement agreement between the Department and the eight Passaic River dischargers. If a discharger expands or incurs capital costs greater than 25 percent of the present value of the facility to upgrade or

replace portions of the existing facility, then the permit will be modified to require a phosphorus effluent limitation of 1.0 mg/L as a monthly average.

16. COMMENT: The Department has indicated that further monitoring is required for chromium, copper and lead to confirm concentration levels. It was our understanding that "clean methods" techniques showed no further study was needed. [11]

RESPONSE: As stated in the TMDL Report, copper and lead were analyzed using Clean Methods and the results showed that these metals were elevated, also one chromium sediment sample was found to be elevated, near Pine Brook. As a result additional monitoring of copper and lead, and further analysis of the hexavalent state of chromium near Pine Brook is warranted to confirm concentration levels for these elements. If the sampling results show that the elements are not above standards, the Department will pursue delisting. Otherwise, a TMDL for any of these metals that are above Surface Water Quality Standards will be developed by June 30, 2002.

17. COMMENT: The lack of detail regarding implementation in this TMDL is an undeniable gap that can only be bridged by local governments and the Department of Environmental Protection. This gap is largely the result of the lack of enforceable phosphorus standard for the Whippany. However, the Whippany Policy Advisory Group has been assured that this is an obstacle that will be overcome during the development of the Passaic River's TMDL. (7)

RESPONSE: A TMDL for Total phosphorus is not required because the Whippany River is in compliance with the Surface Water Quality Standards with respect to phosphorus. The Interim Total Phosphorus Reduction Plan is designed to minimize phosphorus discharges while the Passaic TMDL is being developed. Implementation of the Interim Total Phosphorus Reduction Plan will result in an overall reduction in in-stream phosphorus levels thus helping to maintain or improve water quality in the Whippany River in anticipation of the Passaic TMDL. Each discharger will be responsible through revised permits to apply low cost methods of phosphorus removal and meet the EEQ phosphorus requirements for their treatment plant. The fecal coliform reduction strategies, many of which require local implementation, should also result in a residual benefit of reducing phosphorus loads from nonpoint sources. The amendment identifies the actions being taken by local governments to implement these measures.

18. COMMENT: Does the Environmental Protection Agency provide grants for low-cost phosphorus reduction studies [11]

RESPONSE: The comment is beyond the scope of the amendment. While the Department cannot address whether the USEPA has grant funds available for low cost phosphorus reduction studies, the Department is not aware of any grant programs that are available for these activities.

19. COMMENT: The commenter questioned whether the phosphorus reduction measures included in Appendix B were really "low-cost." [11]

RESPONSE: The low cost phosphorus removal methods that are to be used by each permittee will depend on the actual permitted flow, the configuration and treatment-train process of the wastewater treatment plant and its location within the Whippany River. The low cost phosphorus reductions listed in Appendix D were compiled by the Department's Division of Water Quality. The Department believes these measures are relatively low cost to implement and maintain while achieving a reduction in phosphorus loading. The dischargers are required to review the applicability of each of the reduction methods to its facility and provide a report and implementation schedule for the applicable methods.

20. COMMENT: The commenter noted that treatment plant capacity and commitments for expansion are not legal contracts and that DEP or municipalities have alternatives in zoning scenarios and sewer moratoriums. [4]

RESPONSE: This amendment does not affect or require zoning activities by the municipalities or DEP directed sewer moratoriums.

32 N.J.R. 2132(b)

New Jersey Department of Environmental Protection
Report on the Establishment of a
Total Maximum Daily Load for Fecal Coliform
and an Interim Total Phosphorus Reduction Plan
for the Whippany River Watershed

Executive Summary

Total Maximum Daily Loads (TMDLs) represent the assimilative or carrying capacity of the receiving water taking into consideration point and nonpoint sources of pollution, natural background, and surface water withdrawals. A TMDL is developed as a mechanism for identifying all the contributors to surface water quality impacts and setting goals for load reductions for specific pollutants as necessary to meet surface water quality standards. TMDLs are required, under Section 303(d) of the federal Clean Water Act, to be developed for waterbodies that cannot meet surface water quality standards after the implementation of technology-based effluent limitations. TMDLs may also be established to help maintain or improve water quality in waters that are not impaired. A TMDL establishes Waste Load Allocations and Load Allocations for point and nonpoint sources, respectively. Regulations concerning TMDLs are contained in EPA's Water Quality Planning and Management Regulations (40 CFR 130). "A TMDL is established at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality." (40 CRF 130.7(c))

Where TMDLs are required to address documented surface water quality impairment, allocations are made to the varying sources contributing to the water quality problem in order to reduce the total pollutant load received by the waterbody. Load reduction goals established through TMDLs are achieved through the issuance of wasteload allocations for points source discharges and load allocations for nonpoint source discharges. Since nonpoint source pollution, by definition, does not come from discrete, identifiable sources, load allocations would consist of the identification of categories of nonpoint sources that contribute to the parameters of concern. The load allocation would also include specific load reduction measures for those categories of sources, to be implemented through best management practices (BMPs) including local ordinances for stormwater management and nonpoint source pollution control, headwaters protection practices, or other mechanisms for addressing the priority issues of concern.

In May 1999, the New Jersey Department of Environmental Protection (Department) and USEPA Region II entered into a Memorandum of Agreement including an 8-year schedule to produce TMDLs for all water quality limited segments remaining on the 1998 Section 303(d) List of Water Quality Limited Waterbodies in New Jersey or provide information necessary to remove waterbodies from the list (see Appendix C). This TMDL for the Whippany River Watershed is the first to be developed by the Department under this MOA and are scheduled to be established by December 31, 1999. This report explains the process under which the TMDL for fecal coliform bacteria in the Whippany River Watershed was developed and what the TMDL will require once it is established. Notice of the TMDL has been published in the New Jersey Register as an amendment to the Northeast Water Quality Management Plan pursuant to *N.J.A.C. 7:15-3.4*. The TMDL will also be included in the Whippany River Watershed Management Plan when it is published in early 2000. The purpose of the Whippany River Watershed Management Plan is to advance measurable goals, objectives and strategies to restore, enhance and protect the Whippany River Watershed so that it can be maintained as a viable and valuable resource for present and future generations.

Background Information

The TMDL for fecal coliform was developed as part of the Whippany River Watershed Project. The Whippany River Watershed Project was a pilot effort initiated in October 1993 to aid the Department in developing a comprehensive watershed management process that could be replicated throughout the state. An extensive technical effort has grown out of this project intended to identify, prioritize and analyze water quality in the Whippany River

Watershed and to provide an understanding of the cause and effect relationships associated with all significant pollution sources, both point and nonpoint. The TMDL analysis represents a significant portion of this technical effort.

There has been significant public involvement in the Whippany River Watershed Project, formalized through the creation of the Whippany Watershed Partnership in 1994. The Whippany Watershed Partnership is comprised of approximately 120 representatives of local, county, regional, state and federal government agencies; local and regional businesses and industries; academia; environmental and civic groups; and area residents. The Whippany Watershed Partnership includes a Public Advisory Group (PAG) and several committees that have been working with the Department on different aspects of the Whippany River Watershed Project, including the development of the TMDL methodology. The mission of the Whippany Watershed Partnership is to regain the value of the Whippany River as a vital natural resource through the proper management of the Whippany River Watershed. Proper management means consideration of the entire watershed, including current and future water resources, and the interrelationships between: surface and ground waters, water quality and quantity (e.g. water supply, flooding, etc.), and water and land resources and their uses. Proper management also means consideration of the need to sustain communities and their beneficial growth and improvement while meeting mutually agreed upon environmental protection objectives. These objectives were collaboratively developed through the watershed management planning process and will be achieved through implementation of the Whippany River Watershed Management Plan.

The vision for the Whippany River Watershed is to continue the restoration of the Whippany River and manage its watershed so that we can once again have a viable natural resource that is valued for the many environmental, economic and aesthetic benefits it provides, including: diverse and abundant populations of fish, wildlife, aquatic habitat; clean and available water supplies; recreational opportunities and access; environmentally-responsible economic activity and environmentally compatible infrastructure. In order to realize this vision, the Whippany PAG formed several committees to focus on specific aspects of the watershed and the watershed planning process. A Technical Advisory Committee was formed to work with the Department to identify water quality issues of concern and develop a methodology for monitoring, modeling and assessment to evaluate the root cause of any verified water quality problems. The water quality assessment process began with a review and screening of the historical data for several parameters of concern, including but not limited to those identified as causes for impairment on the 303(d) List. Specific consideration was given to the limitations inherent in heavy metals data collected before "clean" sampling methods had been developed.

Surface Water Quality Standards

The Surface Water Quality Standards (*N.J.A.C. 7:9B* et seq.) apply to all waters of the State of New Jersey. Classifications and criteria for selected parameters that apply to the Whippany River are presented below.

Surface Water Classifications 1 within the Whippany River Watershed

Whippany River	
(Brookside)--Source to Whitehead Road Bridge	FW2-TP(C1)
(Morristown)--Whitehead Road Bridge to Rockaway River	FW2-NT
Whippany River Tributaries	
(Brookside)--Entire length	FW2-TP(C1)
(East of Brookside)--Entire length	FW2-TM
(East of Washington Valley)--Entire length	FW2-TM
(Gillespie Hill)--Entire length	FW2-TP(C1)

(Shongum Mountain)--Entire length FW2-NT

. . .

1 "FW2" means those waters that are not "FW1" or Pinelands Waters

"TP" means trout production

"TM" means trout maintenance

"C1" means Category One waters

"NT" means non-trout

Surface Water Quality Criteria

Surface Water Quality Criteria are found in the New Jersey Surface Water Quality Standards at *N.J.A.C. 7:9B* et seq. and are summarized below for the three major classes of pollutants.

Eutrophication Parameters

Eutrophication is the acceleration of the natural aging process that normally occurs in lakes over geologic time frames. Excessive primary production coupled with excessive sedimentation are the key processes involved in eutrophication. The undesirable effects of eutrophication include siltation and alteration of dissolved oxygen dynamics. Eutrophication is addressed in the surface water quality standards with the following criteria.

1. Total Phosphorus Criteria, *N.J.A.C. 7:9B-1.14(c)*5

For FW2 lakes, ponds, reservoirs, or tributaries at the point where it enters such bodies of water, total phosphorus shall not exceed 0.05 mg/L.

For FW2 streams: Total Phosphorus shall not exceed 0.10 mg/L unless it can be demonstrated that phosphorus is not a limiting nutrient and will not otherwise render the waters unsuitable for the designated uses.

2. The Surface Water Quality Standards Nutrient Policy #2, *N.J.A.C. 7:9B-1.5(g)*2

Nutrient Policy #2 is a narrative criterion that reads:

Except as due to natural conditions, nutrients shall not be allowed in concentrations that cause objectionable algal densities, nuisance aquatic vegetation, or otherwise render the waters unsuitable for the designated uses.

3. The Surface Water Quality Standards Nutrient Policy #3, *N.J.A.C. 7:9B-1.5(g)*3

Nutrient Policy #3 allows the Department to establish site-specific water quality criteria for nutrients that supercede the above generic criteria.

4. Dissolved Oxygen Criteria, *N.J.A.C. 7:9B-1.14(c)*2

For FW2-TP: not less then 7.0 mg/L at any time.

For FW2-TM: 24 hour average not less then 6.0 mg/L, but not less than 5.0 mg/L at any time.

For FW2-NT: 24 hour average not less than 5.0 mg/L, but not less than 4.0 mg/L at any time.

For FW2-TM and FW2-NT, supersaturated dissolved oxygen values shall be expressed as their corresponding 100 percent saturation values for purposes of calculating 24 hour averages.

Pathogen Indicators

Because pathogens (disease-causing organisms) present in surface waters are few in number and difficult to isolate, groups of more common bacterial species, commonly found in association with pathogens, are used as indicators of possible pathogenic contamination. Two groups of bacteria are currently included in the Surface Water Quality Standards as pathogen indicators: fecal coliforms and enterococci. Fecal coliform data have historically been used to determine impairment due to pathogenic contamination.

Fecal Coliform, *N.J.A.C. 7:9B-1.14(c)*1.ii

For FW2 Classifications: levels shall not exceed a geometric average of 200 counts per 100 ml, nor should more than 10 percent of the total samples taken during any 30-day period exceed 400 counts per 100 ml.

Toxics

Surface water quality criteria for toxics are listed individually in 7:9B-1.14(c). Criteria for toxic constituents of concern in the Whippany River Watershed are listed below.

Metals, N.J.A.C. 7:9B-1.14(c)13

arsenic--0.0170<micro g/L total recoverable for all FW2

beryllium--no applicable criteria

cadmium--1.0 <micro g/L dissolved for all FW2 (EPA standard applies), depending on hardness

chromium trivalent--180 <micro g/L dissolved for all FW2 (EPA standard applies), depending on hardness

hexavalent--10 <micro g/L dissolved for all FW2 (EPA standard applies)

copper--11 <micro g/L dissolved for all FW2 (EPA standard applies)

lead--2.5 <micro g/L dissolved for all FW2 (EPA standard applies), depending on hardness

mercury--0.012 <micro g/L dissolved for all FW2 (EPA standard applies)

zinc--100 <micro g/L dissolved for all FW2 (EPA standard applies), depending on hardness

Un-ionized Ammonia
For FW2-TP and FW2-TM: 20<micro g/L 24 hr. average
For FW2-NT: 50<micro g/L 24 hr. average

303(d) Listed Parameters

In accordance with the Federal Clean Water Act, the Department prepared New Jersey's 1998 list of water quality limited waterbodies. This list is required by section 303(d)(1)(A) of the Federal Clean Water Act and is a component of the Statewide Water Quality Management Plan, as required by the Water Quality Management Planning Rules at *N.J.A.C. 7:15-2.1(a)*8ii and 7:15-6. Section 303(d) of the Federal Clean Water Act requires New Jersey to identify waters that are not attaining or not expected to attain water quality standards after the implementation of technology based effluent limits. New Jersey must prioritize these water quality limited waterbodies for TMDL analyses that are

planned within the next two years.

New Jersey's 303(d) List divides water quality characteristics for waters in the State of New Jersey into two categories. Part 1 lists waters where impairments of water quality are known or where exceedances are based on conventional pollutants (except for ammonia) and fecal coliform, fish and shell fish consumption advisories, and other exceedances of numerical criteria compiled through monitoring subjected to QA/QC procedures developed after 1994. Part 2 represents waters with evidence of water quality concerns but without sufficient information to characterize the waterbody as a "known water quality limited segment." Such waters either lack extensive data or the existing data indicates that further analysis is warranted. Heavy metals and ammonia fall into this "suspected" category. All chemicals suspected of causing water quality impairment undergo supplemental monitoring to confirm impairment and to develop appropriate management responses.

Below is a summary of the 1998 Section 303(d) Known Water Quality Impairment listings for the Whippany River (Part 1).

Waterbody Name	Reach #/Location	Pollutant/Impact: Water Quality Violation
Whippany River	02030103-024-020 Morristown	fecal coliform total phosphorus
Whippany River	02030103-024-020 near Pine Brook	dissolved oxygen fecal coliform total phosphorus

Below is a summary of the 1998 Section 303(d) Suspected Water Quality Impairment listings in the Whippany River (Part 2).

Waterbody Name	Reach #/Location	Pollutant/Impact: Water Quality Violation
Whippany River	02030103-024-020 near Pine Brook	ammonia, arsenic 4 , beryllium 2,4 , cadmium 2,4 , chromium 2 , copper 4 , lead 4 , zinc 3,4
Whippany River	02030103-024	arsenic, beryllium 2 , cadmium 2 , chromium 2,3 , copper, lead, mercury, zinc 3

. . .

2 Metal was proposed for delisting with respect to human health criteria for total recoverable metals in the 1998 Impaired Waterbodies List. The delisting will be reflected in the 2000 Impaired Waterbodies List.

3 Metal was proposed for delisting with respect to aquatic life criteria for dissolved metals in the 1998 Impaired Waterbodies List. The delisting will be reflected in the 2000 Impaired Waterbodies List.

4 Metal was inadvertently omitted from listing tables, but is listed as discussed in text (pages 15-17 and 25), in 1998 Impaired Waterbodies List. The table above includes these corrections.

Response to the 1998 303(d) List for the Whippany River

Suspected Water Quality Impairments

Analysis of Ambient Data

The original basis for listing the Whippany River on the 303(d) List was water quality violations observed in data collected in the early to mid 1980's from the Morristown and Pine Brook monitoring sites which was reviewed in the late 1980's for the State's 304(l) list. Many historical discharges are now no longer present and many discharges, while remaining, have undergone significant upgrades to their treatment systems. In order for the Department to assess current conditions, several recent reviews were undertaken of in-stream data collected at the Morristown and Pine Brook sites. An initial review of historical data was performed in 1994 for the Whippany Pilot Project in order to delineate pollutants of concern for the Project. A subsequent review to satisfy requirements specifically under 303(d) followed in 1997. The adopted de-listings in the 1998 303(d) list for beryllium, zinc, cadmium (for human health) and chromium in the current 303(d) List were based upon this second 303(d)-specific review.

In 1995, stream monitoring was performed in selected locations of the Whippany River according to a sediment screening methodology developed in 1994 to target metals monitoring. Metals were analyzed using Clean Methods 5 for copper, lead and cadmium. Results of this monitoring showed that these metals were below levels formerly indicated by previous traditional sampling. It is expected that the continued 303(d) listing of lead, copper, and chromium for violations of acute aquatic life criteria and for human health (lead) will only be temporary, pending the additional sampling necessary to satisfy the new protocols for delisting, currently being developed between USEPA Region II and the Department.

Department Response

Below is a summary of the responses the Department discussed in the 303(d) List for those toxics remaining on the list.

Ammonia: Municipal discharge data indicate a declining input of ammonia statewide and in the Whippany River. The Department is pursuing delisting ammonia for the Year 2000 303(d) List.

Arsenic: The current level of detection is 1.0 <micro g/L and the surface water quality criterion is 0.017 <micro g/L for human health as total recoverable. Due to low human health criterion in relation to the current minimum detection limit, laboratory procedures employing lower detection limits must be employed to reassess this metal statewide.

Beryllium: The Department is proposing to delist beryllium statewide, since there are no applicable surface water quality criteria associated with these elements. Results will be incorporated into the Year 2000 303(d) List.

Cadmium: The calculated aquatic life criterion of 1.1 <micro g/L is similar in value to the level of detection for cadmium of 1.0 <micro g/L. Therefore, this element will continue to be listed until such time as alternative analyses using lower detection limits can be applied.

Chromium: Review of the record (1990-1997) shows no violations as total recoverable using the human health criterion of 160 <micro g/L at the Morristown and Pine Brook stations. Total recoverable serves as a screening surrogate for the dissolved form using the aquatic life chronic criterion. In assessing the aquatic life support, the criteria for the hexavalent form is the most restrictive; the criteria are 15 <micro g/L and 10 <micro g/L for acute and chronic exposure respectively. No values as total recoverable chromium (sum of all valence states) exceed 2.0 <micro g/L at Morristown; however, one sample was 14 <micro g/L during the period of review at the site near Pine Brook. Therefore, the Department will conduct further analysis of the hexavalent state near Pine Brook.

Copper: Preliminary sampling in the Whippany River using clean methods and analyzing filtered samples indicate that copper levels are elevated. Therefore, additional monitoring is warranted to confirm concentration level for this element.

Lead: Preliminary sampling in the Whippany River using clean methods and analyzing filtered samples indicate that lead levels are elevated. Therefore, additional monitoring is warranted to confirm concentration level for this element.

Mercury: The current level of detection is 0.1 <micro g/L and the surface water quality criterion is 0.012 <micro g/L for chronic aquatic life. Due to low criterion in relation to the current minimum detection limit, laboratory procedures employing lower detection limits must be employed to reassess this metal statewide.

Zinc: Review of the record (1990-1997) at both Morristown and Pine Brook show no violation of the calculated aquatic life criteria of 49 and 42 <micro g/L, respectively, using total recoverable as a screening surrogate for dissolved. Therefore, the Department is pursuing delisting zinc at both locations for the Year 2000 303(d) List.

Resampling of the Whippany River and other sites within WMAs 3, 4, and 6 for metals as indicated above remains a very high Departmental priority. Low flow conditions are required to conduct this monitoring, and these have not occurred since before Hurricane Floyd in September 1999. Since metal monitoring results to date have not confirmed any water quality impairments, TMDLs for metals are not warranted at this time.

Known Water Quality Impairments

The Department is required to establish TMDLs for any parameters identified as causing a water quality impairment to the Whippany River, pursuant to the TMDL MOA and the 1998 Section 303(d) list. These parameters were identified in the 1998 303(d) List as: dissolved oxygen, fecal coliform and total phosphorus. The Department is proposing a targeted response to address each of these parameters that includes: de-listing for dissolved oxygen, demonstrating that the Whippany River is in compliance with the Surface Water Quality Standards with respect to total phosphorus, and a TMDL for fecal coliform.

Dissolved Oxygen

The 1996 Statewide Water Quality Inventory Report for New Jersey (the 305(b) Report) states that the Whippany River did not exceed surface water quality criteria for dissolved oxygen at Morristown and Pine Brook. These stations are monitored 5 times per year and the 305(b) report analysis was based on data collected between 1990 and 1994. Data collected from 1995 through October 1997 at Morristown and Pine Brook also showed no exceedences of dissolved oxygen criterion. Improving trends in dissolved oxygen concentration from 1973 to 1995 supports these findings. The 1996 305(b) report states:

Comparisons of dissolved oxygen (DO) levels between 1973 and 1995 indicate that DO increased significantly between 1973 and 1980, and then again from 1980 to 1995. These are believed to be the results of substantial upgrades to the wastewater treatment systems that have occurred within the watershed and the corresponding substantial reduction in the discharge of oxygen demanding materials. These reductions are reflected in reduction in in-stream biological oxygen demand (BOD) of some 80 percent in twenty years in the Whippany River. 6

Dissolved oxygen data, including diurnal samples taken in 1994 and 1995 from the Whippany River Mainstem, indicate that dissolved oxygen remains above the 24-hour average standard of 5.0 mg/L. These data support delisting at these locations, which will be pursued during the development of the Impaired Waterbodies List for 2000.

Total Phosphorus

According to the Surface Water Quality Standards Nutrient Policy #2 (*N.J.A.C. 7:9B-1.5(g)* 2): ". . .xcept as due to natural conditions, nutrients shall not be allowed in concentrations that cause objectionable algal densities, nuisance aquatic vegetation, or otherwise render the waters unsuitable for the designated uses." Under *N.J.A.C. 7:9B-1.14(c)* 5, ". . . Total Phosphorus [in an FW2 stream] shall not exceed 0.10 mg/L unless it can be demonstrated that phosphorus is not a limiting nutrient and will not otherwise render the waters unsuitable for the designated uses." (emphasis added)

The 1998 303(d) List identifies the Whippany River as impaired for Total Phosphorus because in-stream concentrations in some locations exceed 0.1 mg/l. Since the Department has determined that phosphorus is neither limiting primary production nor causing impairment of designated uses in the Whippany River, 7 the numerical Total Phosphorus criterion does not apply in the Whippany River. In addition, since there is no evidence of objectionable algal densities or nuisance aquatic vegetation in the Whippany River, there is no violation of the Nutrient Policy. Therefore, a TMDL for Total Phosphorus is not required at this time because the Whippany River is in compliance with the Surface Water Quality Standards with respect to phosphorus.

Despite the fact that the numerical phosphorus criterion does not apply in the Whippany River and the Whippany River is in compliance with the Surface Water Quality Standards with respect to phosphorus, the Department is not pursuing the removal of Total Phosphorus from the 303(d) List for the following reason. The Whippany River is a tributary to the larger Passaic River Basin, wherein phosphorus is known to contribute to the impairment of designated uses as evidenced by documented excesses in algal growth. The TMDL for Total Phosphorus in the Passaic River is scheduled for completion by June 30, 2002. 8 It is expected that phosphorus controls may be required in the Whippany River and other tributaries to the Passaic River, as well as within the mainstem, as part of the TMDL for Total Phosphorus in the Passaic River in 2002. However, the extent and nature of those controls is not known at this time and can only be determined through the TMDL process. At this time, the Department is implementing interim phosphorus restrictions (described below) on municipal dischargers within the Whippany River Watershed, limiting their discharge to existing effluent quality. This restriction will serve to minimize further phosphorus discharges to the Passaic River while the TMDL is being developed. In addition, the implementation of the TMDL for fecal coliform in the Whippany River Watershed will provide a residual reduction in phosphorus contributions from nonpoint sources of bacterial pollution that also contribute phosphorus.

The Passaic River TMDL process will address pollutants of concern including, at a minimum, dissolved oxygen, nutrients and pollutant parameters contributing to eutrophication. Significant point and nonpoint sources of phosphorus in the Whippany River may be affected by the outcome of the Passaic River TMDL development process. The Passaic River TMDL will be developed in collaboration with watershed partners in Watershed Management Area (WMA) 3 (Pompton, Pequannock, Wanaque and Ramapo River Watersheds), WMA 4 (Lower Passaic and Saddle River Watersheds) and WMA 6 (Whippany, Rockaway, Upper and Mid Passaic River Watersheds). A Public Advisory Committee and a Technical Advisory Committee for WMA 6 has already been formed and is currently working with the Department to develop a Watershed Characterization and Assessment Report. Stakeholders from WMAs 3 and 4 will also be included in the development of the Passaic River TMDL.

Interim Total Phosphorus Reduction Plan

While the Whippany River is in compliance with the Surface Water Quality Standards with respect to phosphorus and no impairment of the River's designated uses are caused by excessive primary production, there is no doubt that excessive phosphorus levels further downstream are causing adverse impacts to the Passaic River. It is not known how much, if any, total phosphorus from the Whippany River is contributing to downstream total phosphorus levels.

However, there is agreement among the Whippany Watershed Partnership that existing effluent quality should be maintained and any feasible short-term reductions in phosphorus levels should be pursued prior to the development of a phosphorus TMDL for the Passaic River in order to reduce or prevent further increases in phosphorus concentrations. This Interim Total Phosphorus Reduction Plan, developed from the recommendations of the Whippany River Watershed Technical Advisory Committee, is being implemented as an interim response to phosphorus reduction before the Passaic River TMDL is developed.

This Interim Total Phosphorus Reduction Plan requires that between the adoption of this Plan and the adoption of the Passaic River TMDL, municipal point source dischargers within the Whippany River will investigate and implement appropriate low cost methods to reduce phosphorus effluent loading. The goal of these interim measures is to achieve a net reduction of phosphorus loading from the permittees before the Passaic River TMDL has been developed. Furthermore, the Department will revise NJPDES permits based on a calculation of existing effluent quality and applicable low-cost improvement measures.

The permittees shall explore the low cost phosphorus reduction methods attached as Appendix D and provide a report to the Department within 6 months of the adoption date of this Interim Total Phosphorus Reduction Plan addressing the applicability of each method to permittees' treatment facilities. Appendix D is not an exclusive list, and permittees are encouraged to identify additional low cost phosphorus reduction methods. For each identified applicable method, the permittee shall immediately commence implementation and provide an implementation schedule as part of the report. If a permittee has previously identified and implemented low cost phosphorus reduction methods, the report shall identify the method(s), the date(s) of implementation, and the effectiveness of the method in reducing phosphorus loading. The Department shall determine and notify the permittees within 45 days of receipt whether the reporting requirement has been satisfied. In the event the Department determines the report to be deficient, the notice shall specify any deficiencies which must be addressed.

Pursuant to N.J.A.C. 7:14A-16 et seq., the Department shall issue draft major modifications or draft permit renewals to the affected municipal NJPDES dischargers in the Whippany River (Appendix A) as expeditiously as possible but not later than one year after adoption of this plan. Such modifications or renewals will include total phosphorus effluent limitations based on existing effluent quality calculated in accordance with *N.J.A.C. 7:14A-13.8* (Appendix B) as well as implementation of low cost phosphorus reduction methods. The effluent limit shall be for a concentration expressed as a monthly average on a seasonal basis. The winter season shall be deemed to be November through April, and the summer season shall be deemed to be May through October. The permit modification or permit renewal shall include a phosphorus influent-monitoring requirement based on the phosphorus effluent monitoring frequency. These permit modifications affect only municipal dischargers since they comprise the vast majority of phosphorus point source load to the Whippany River.

Permittees may petition the Department to modify the existing effluent quality phosphorus effluent limitation established by the above to reflect an increase of influent phosphorus due to phosphorus-based corrosion control measures by a supplier of water. The Petition shall address: the water suppliers dosing practices, variation of phosphorus concentrations within the water supply distribution system, relationship of the water supply within the permittees service area (by percentage of permittees total flow), changes in industrial contributions, status and effectiveness of implemented low cost phosphorus reduction methods, and a demonstration of relationship between influent phosphorus and effluent phosphorus monitoring data.

In the event that a permittee either physically expands its facilities prior to the adoption of TMDL-based Wasteload Allocations for the Passaic River to accommodate additional influent or incurs capital costs greater than 25 percent of the present value of the facility to upgrade or replace portions of the existing treatment facility, the NJPDES permit shall be modified to include a phosphorus effluent limitation of 1.0 mg/L as a monthly average. In the event a permittee requests a flow re-rating which does not require expansion or upgrades of any kind to the existing treatment facility, the permit modification, if granted, shall include a monthly average loading limit for phosphorus based on the flow value prior to the re-rated flow value and the concentration value established pursuant to the above. The interim phosphorus

limit shall remain in effect until establishment of the Passaic River Basin TMDL, at which time the NJPDES permits shall be modified to incorporate effluent limitations based on adopted Wasteload Allocations and, if appropriate, provide a schedule of compliance.

Recently, eight municipal NJPDES dischargers in the Passaic River Basin signed a stipulation of settlement, which is similar in nature and content to this described interim total phosphorus reduction plan. The Hanover STP mentioned in this report is party to that settlement.

Most of the short-term measures designed to mitigate fecal nonpoint source loading (see below) will also achieve an accompanying reduction in phosphorus. The Whippany River Watershed Nonpoint Source Pollution Control Guidance Manual prepared by the Whippany NPS Workgroup will serve as a general guide to local officials in selecting appropriate BMPs that best address nonpoint source pollutants of concern in their municipality or subwatershed. The guide will help the user through selecting specific source control measures that are pollutant specific as well as site specific.

Fecal Coliform

As stated previously, the Surface Water Criteria for fecal coliform is at *N.J.A.C. 7:9B-1.14(c)*1ii.

For FW2 Classifications: levels shall not exceed a geometric average of 200 counts per 100 ml, nor should more than 10 percent of the total samples taken during any 30-day period exceed 400 counts per 100 ml.

Sources

Fecal coliform is a group of bacteria used as an indication of the potential presence of pathogens (diseased causing organisms) of fecal origin. The sources of fecal coliform contamination have been narrowed down from a myriad of potential fecal nonpoint source pollutant sources. Source identification was determined from:

Evaluation of water quality data from the nonpoint source monitoring conducted in the Whippany River Watershed in 1996 and 1997 9 indicates high levels of fecal coliform at specific locations in the Watershed. These locations are indicative of certain land uses. For example, the table below is a summary of the fecal coliform monitoring from November 9, 1996:

Station ID	Land Use	Range fecal coliform
LS-1 (AA)	Forest Land Cover	55-2,800
LS-2 (BB)	Mixed Land Use	7,600-21,000
LS-3 (CC)	Industrial	11,000-61,000
LS-4 (DD)	Low Density Residential	5,000-92,000
LS-5 (EE)	Wetlands Runoff	210-390

In addition, prior studies of a bathing beach in Mendham Township by local health officials indicated that septic systems might be the contributing factor to fecal coliform impairment during a storm event. Canada geese and associated fecal matter was observed visually by health officials at the Mendham Township bathing beach as well as at a Lake Parsippany bathing beach. The Department in collaboration with the Whippany NPS Workgroup and the Technical Advisory Committee narrowed down the scope of the primary sources of fecal contamination to:

Human Sources of Fecal Coliform:

. Malfunctioning or older improperly sized septic systems in the upper

portion of the Whippany River Watershed

Non-Human Sources of Fecal Coliform:

. Canada geese, waterfowl and other wildlife

. Pet waste

. Stormwater basins which can act as accumulation points of fecal matter (from pets, waterfowl and wildlife)

Loading Capacity

The Whippany River Watershed Model was developed by the Department in collaboration with the Technical Advisory Committee and the Modeling Subcommittee. Water quality scientists on the TAC provided peer review throughout the development of the model and acceptance of the final product. The model integrates a landside runoff model with a spatially explicit receiving water model into a novel code, the theory for which is presented in Appendix F. Intensive steady-state monitoring events 10 were performed on three different occasions in 17 locations throughout the watershed to provide data for calibration and verification of the receiving water model. In addition, wet weather data were collected during three different storm events in 5 sub-watersheds and two in-stream locations to provide data for calibration and verification of the landside model. The landside model was calibrated successfully in four sub-watersheds for fecal coliform.

Fecal coliform concentrations were estimated by applying model coefficients determined from calibration and verification of individual sub-watersheds 11 to the Whippany River Watershed Model. Figure 1 shows the current condition in terms of daily fecal coliform concentrations and 30-day geometric mean concentrations simulated over one year. The applicable 30-day geometric mean criterion of 200 counts/100ml is also shown for comparison. The dry weather base concentration is about 225 most probable number (MPN) MPN/100ml, but storm events throughout the year drive the 30-day geometric mean considerably higher. Figure 2 estimates the annual loading profile of point and nonpoint sources, with nonpoint sources being broken down by land use. Point sources contribute a negligible portion of the annual load and in fact provide dilution of fecal coliform.

Click here for

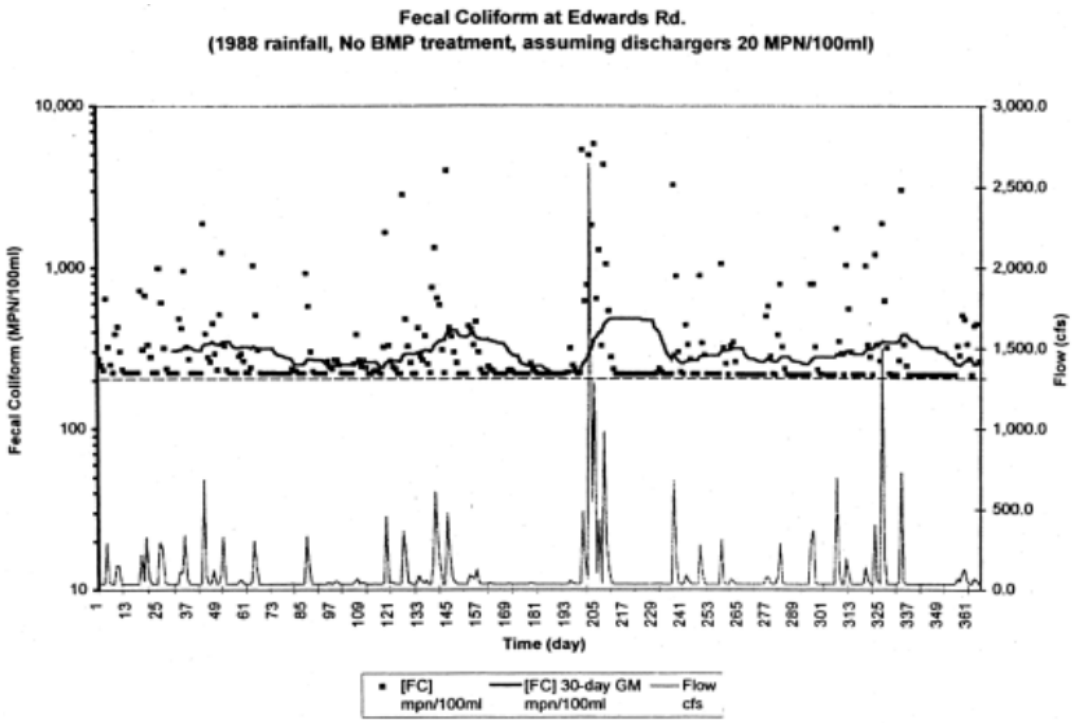

Figure 1 Model simulation of current condition

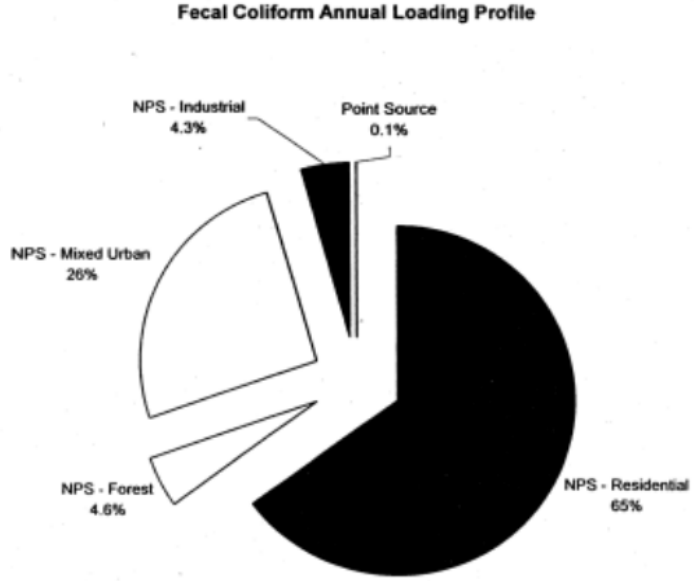

Figure 2 Model estimation of Point to Nonpoint Source Loading Profile

image

The target condition was determined by reducing nonpoint source loading rate such that the maximum 30-day geometric mean was set equal to the 200 MPN/100ml criterion (Figure 3). A 58.5 percent reduction on overall nonpoint source loads was necessary to achieve the simulated target condition. Notice that the base dry weather concentration in the target condition reduces to less than half the geometric mean criterion. Over the duration of the one-year simulation, only 6.3 percent of the daily concentrations were higher than 400 MPN/100ml.

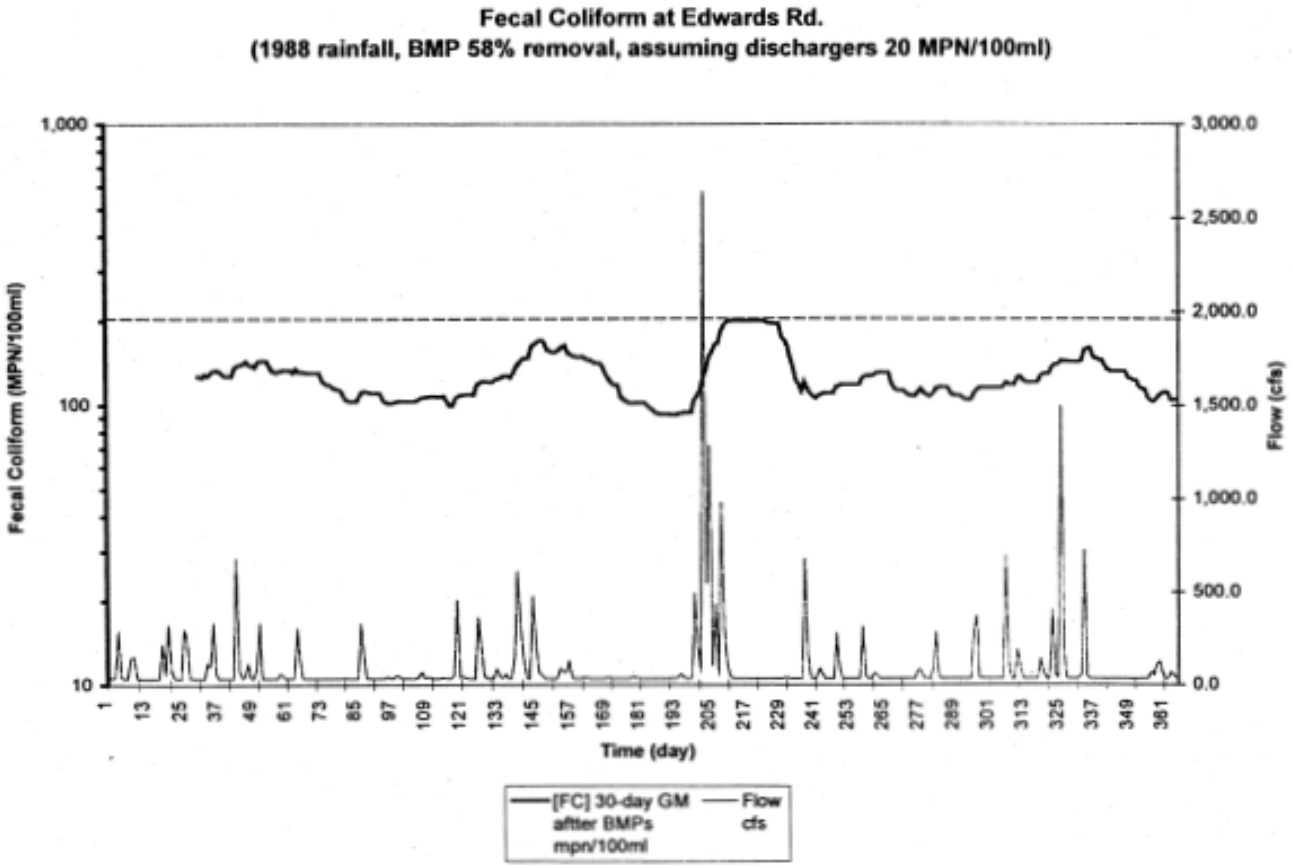

Figure 3 Model simulation of target condition

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TMDL Calculation

Annual loads were estimated by summing up the daily loads over a one-year simulation. In order to comply with the 200 MPN/100ml 30-day geometric mean criterion for fecal coliform, the TMDL for the Whippany River Watershed is established as follows:

TMDL = 5.40e14 MPN/year

= 1.75e12 WLA + 5.38e14 LA

The TMDL is expressed as MPN/year because the loads are delivered in storm events and the criterion is expressed as a 30-day geometric mean. The Federal TMDL regulations allow "appropriate measures" (*40 CFR 130.2(I)*) to be used to express TMDLs. MPN is the appropriate unit because it is the only unit of microbial indicators commonly measured. It is not possible to allocate storm-driven source loads using a daily time scale, since storm-driven nonpoint sources are episodic in nature.

Wasteload allocations for all point sources are combined into a single term based on current flows and concentrations (see Appendix A). Municipal dischargers are required to disinfect effluent prior to discharge and to meet surface water quality criterion for fecal coliform in their effluent. Since the dischargers routinely achieve essentially complete disinfection (less than 20 MPN/100ml), the requirement to disinfect is effectively more stringent than the fecal coliform effluent criterion. For the purposes of the TMDL calculation, municipal effluent was therefore assumed to contain 20 MPN/100ml. Current rather than permitted flows were used because the effluent acts to dilute the fecal coliform in the stream; permitted flows would result in a non-conservative calculation under current flows. The total point source contribution is a fraction of a percent of the total load, and in reality acts to improve the water quality with respect to fecal coliform. Consequently, this fecal coliform TMDL will not impose any change in current practice for point sources and will not result in changes to existing effluent limits.

Evaluating annual load using a dynamic model made it possible to calculate the impact of episodic loads on 30-day geometric mean (Figures 1 and 3). The critical condition occurs when the intense rainfall over about 10 days following a dry period drives the 30-day geometric mean to its highest point.

Seasonal Variations

Seasonal variations are accounted for by basing the TMDL on the highest 30-day geometric mean that occurs during the year. By reducing the nonpoint source load enough to make the highest 30-day geometric mean compliant with the fecal coliform criterion, the 30-day geometric means throughout the rest of the year will be proportionately less than the criterion.

Margin of Safety

A number of conservative assumptions implicit in the TMDL calculation provide the Margin of Safety necessary to account for "lack of knowledge concerning the relationship between effluent limitations and water quality." (*40 CFR 130.7(c)*)

First, the choice of 1988 rainfall data provides a higher simulation of peak 30-day geometric mean compared to other rainfall years. 1988 total rainfall recurs every two years. Using drier rainfall years would reduce the fecal coliform, since it is rainfall that delivers virtually all the load. Using wetter rainfall years also reduces the simulated concentration of fecal coliform, since it is during the dry periods between storms that buildup occurs. Repeated rainfall events will provide dilution if there are not enough dry days for buildup to occur. 1988 rainfall included a very large 10 day storm event that was preceded by a long dry period. The subsequent peak 30-day mean drove the TMDL analysis and provided Margin of Safety.

Another conservative assumption was the use of current effluent flow from the municipal dischargers. Sewage treatment effluent is disinfected and contains extremely low bacterial counts. Permitted flows would provide more dilution and were not used to calculate the TMDL.

Finally, it is generally recognized that fecal contamination from stormwater poses much less risk of illness than fecal contamination from sewage or septic system effluent. 12 As Figure 2 shows, fecal coliform in the Whippany River is almost exclusively nonpoint source. Furthermore, most of the fecal coliform is flushed into the system during rainfall events and passes through the Whippany River in just a few hours. Bathing recreation is not a current use in the Whippany River, but bathing recreation in general occurs during dry periods.

Monitoring Plan

The Department will conduct follow-up monitoring through the Ambient Surface Water Monitoring Network program. In order to determine compliance with the pathogen indicator criteria, the Department samples each station in the network a minimum of 5 times in a 30-day period during the summer months of June to August. This sampling protocol is consistent with the Surface Water Quality Criteria for fecal coliform. At a minimum, the downstream station at Edward's Road that was used to calculate the fecal coliform TMDL will continue to be included in the Network and sampled annually accordingly. The Department fully expects that, after implementation of management measures to reduce nonpoint sources of fecal coliform, pathogen indicator levels will not exceed a geometric average of 200 MPN/100ml, nor will more than ten percent of the total samples taken during any 30-day period exceed 400 MPN/100ml.

Management Measures for Nonpoint Sources of Fecal Coliform

For each major nonpoint source category identified above, short-term management measures are identified below that will begin to reduce the source and/or the amount of fecal coliform discharged to the Whippany River. Unlike other pollutants that accumulate and persist in the environment after external sources have been removed, fecal coliform survives only a few days in the environment; therefore it is anticipated that the Whippany River will respond very quickly to reductions in fecal coliform sources. Additional measures will be required to verify and further reduce or eliminate each source of fecal coliform within the Whippany River Watershed in order to attain surface water quality standards.

Short-Term Management Measures

The following short-term measures either commenced in 1999 or will begin in early 2000 and will continue to be implemented throughout the next two years. These measures are aimed at reducing nonpoint source pollution in the Whippany River Watershed.

. Proposed inter-municipal agreement by the Whippany River Watershed Action Committee that calls for the 16 watershed municipalities to recommend specific actions and programs to preserve, protect and maintain the land and water resources of the Whippany River Watershed.

. In 1999, the Whippany River Watershed Action Committee was notified of a Section 319 (h) NPS pass through grant award in the amount of $ 17,5000 for restoration work in the watershed. Under this grant, the municipal Department of Public Works will implement BMPs for bacteria, phosphorus and sedimentation from nonpoint sources.

- In 1999, Hanover Township was notified of a Section 319 (h) NPS pass through grant award for $ 50,000 to work with the Whippany River Watershed Action Committee to develop model ordinances for the 16 watershed municipalities to adopt in order to reduce nonpoint source pollution from stormwater runoff.
- In 1999, Hanover Township was notified of a Federal 604(b) pass through grant in the amount of $ 75,000 to conduct a diagnostic study of fecal impairment in the upper portions of the Whippany River Watershed.
- "A Cleaner Whippany River Watershed" nonpoint source pollution control guidance manual was accepted as a "living document" by the PAG at their December 7, 1999 meeting. It will be published in 2000 and formally presented at a workshop on May 11 and 12, 2000.

Whippany River Watershed Nonpoint Source Pollution Control Guidance Manual

Additional fecal coliform and phosphorus reductions will also be achieved through implementation of the Nonpoint Source Pollution Control Guidance Manual prepared by the Whippany NPS Workgroup entitled "A Cleaner Whippany River Watershed." It was written to serve as a general guide to local officials in selecting appropriate BMPs that best address nonpoint source pollutants of concern in their municipality or subwatershed. The Guidance Manual will help the user through selecting specific source control measures that are pollutant specific as well as site specific. "A Cleaner Whippany River Watershed" is attached in Appendix G.

The Guidance Manual will be presented to local officials and township engineers in each of the 16 municipalities located within the Whippany River Watershed. The step-by-step approach promoted by the Guidance Manual, as well as the more common best management practices associated with land use, pre-development and/or redevelopment conditions throughout the watershed, will be presented in several workshops and field trips held throughout the 16 watershed municipalities. The Guidance Manual was distributed in January 2000 and subsequent workshops will be held in May 2000 to present the document to the public. The Urban Conservation Action Partnership, a public/private partnership for natural resources conservation, is the recipient of an FY 2000 Section 319 (h) pass through grant to promote the Guidance Manual in order to "increase environmental literacy of public officials and consulting engineers, heads of departments of public works, landscape architects and planners." The grant project includes an evaluation component which will ascertain whether BMPs were implemented with regularity after attending these workshops.

The Guidance Manual identifies thirteen stormwater source control measures and provides a methodology that will assist the user in choosing a suitable BMP(s). The user of the Guidance Manual will also be able to determine which nonpoint source pollutant is most suitably addressed by the BMP and what percentage pollution concentration reduction may be expected from implementing and maintaining the BMP. In many cases, a specific BMP may reduce several nonpoint source pollutants but, with different degrees of effectiveness. The Guidance Manual proposes seven decision-making tables that will be useful in the selection of an appropriate BMP:

Stormwater Treatment Suitability: Determine if the BMP meets both the hydrology storage and water quality treatment requirements.

Community and Environmental Factors: Targets the potential BMP to determine if it has any important community or environmental benefits or drawbacks that might influence the selection process.

Site Feasibility Factors: Determines if there site limitations such as soils, drainage area, slope, and geology that might hinder or assist the effectiveness of implementing the BMP.

Cost and Maintenance Factors: Identifies relative cost of Best management practices (high, medium or low) along with its maintenance factors.

Most Appropriate Land Uses for Best Management Practices: Identifies the appropriateness of the BMP based on the one of five development categories.

Estimated Pollutant Reduction Capability for Best Management Practices: Where information was available, table identifies pollutant concentration reduction percentages derived from research, modeling and best professional judgement.

Permitting Considerations: Provides local and permitting guidance based on site features such as wetlands.

The Whippany River Watershed NPS Workgroup has endorsed the short-term management measures, including the Guidance Manual, which will be implemented at the municipal level through a combination of municipal ordinances, local agreements, education and outreach, and pass through grants. These measures, once implemented, will begin to reduce fecal coliform levels within the Whippany River Watershed while longer term measures are being developed. The Whippany River Watershed Management Plan will also include these short-term measures and will promote these practices to ensure that they are implemented where practicable throughout the watershed.

Long-Term Management Strategies

While the short-term management measures will begin to reduce sources of fecal coliform in the Whippany River Watershed, additional measures will be needed to verify and further reduce or eliminate these sources. Some of these measures can be implemented now, where resources are available and sources have already been identified. Otherwise, specific watershed management strategies will be developed for each source identified below as part of the Watershed Management Area Plan for WMA 6. These strategies will be tailored to reduce each specific source's contribution of fecal coliform to the Whippany River Watershed. The strategies will all be designed to verify and assess these major source categories and to identify individual sources among them; develop specific measurable objectives; propose targeted management measures; identify measurable outcomes, deadlines, and responsible entities; and include monitoring and evaluation requirements to determine the success of the various management measures in achieving the strategies' objectives. These strategies will also address public involvement, operation and maintenance over time, and provide a cost-funding matrix.

The long-term management strategies will be developed collaboratively between the Department and the WMA 6 Public Advisory Committee, Technical Advisory Committee, Whippany Action Committee and Whippany Transition Team. The long-term strategies will be included in the WMA 6 Watershed Management Area Plan when it is

developed.

Source Categories for Long-Term Management Strategies

Malfunctioning and Older Improperly Sized Septic Systems

Malfunctioning and older improperly designed septic systems contribute to fecal coliform loading in two ways: the system may fail hydraulically, where there is surface break out; or hydrogeologically, in which case the soils are inadequate to filter the pathogens. Specific management measures include:

. Conduct additional sanitary surveys and locate the systems using global positioning satellite system technology
. Implement results of the sanitary survey and diagnostic study resulting in a septic system management program

Canada Geese, Pest Waterfowl and other Wildlife

With the proliferation over the past 20 years of large corporate and recreational turf areas, the Canada goose resident population has exploded. Geese prefer to eat the low-fiber, high carbohydrate characteristics of mowed, fertilized turf. Consequently, parks, corporate lawns, and golf courses are subject to over browsing, shoreline erosion and excessive fecal matter near the water's edge. Specific management measures include:

. "No Feed Ordinances" for all waterfowl and wildlife
. Shoreline fencing and other barriers to eliminate access to grassed area along the waterways
. Habitat alteration; eliminate mowed turfgrass replace with buffer of tall grasses, shrubs and trees
. Overhead wire grids on ponds or lakes (outside of goose molting period) to restrict birds' access to the surface
. Hunting during established hunting seasons

Pet Waste

Pet waste contributes to fecal material and other nonpoint source pollutants such as nutrients. Bacterial levels in stormwater appear to be greater in residential areas than industrial or commercial zones. Thus the high concentration of pets associated with residential areas is a primary source of fecal contribution to stormwater. Specific management measures include:

. Adopt Pet Waste disposal ordinances for all 16 watershed municipalities
. Focus special attention to Patriot's

Path along the Whippany River with signage and plastic bag dispensers

. Provide plastic bag dispensers in public recreation areas

Stormwater Basins

Stormwater detention/retention basins as well as wet storm ponds can act as accumulation points for fecal matter and other nonpoint source pollutants. A fast flush of runoff from a storm event detaches, mobilizes, and transports these substances directly to the nearest surface waters because of their design as flood control devices rather than as pollutant source control measures. Specific management measures include:

. Inventory stormwater basins and locate them using global positioning satellite system technology

. Conduct regularly scheduled stormwater basin cleanout programs

. Retrofit stormwater basins from flood control to nonpoint source control

Conclusion

With the implementation of short-term management strategies (to begin in 1999 and to be completed by 2002), long-term management strategies (to begin in 2004), and the Whippany River Watershed Nonpoint Source Pollution Control Guidance Manual, the Department has reasonable assurance that fecal coliform concentrations in the Whippany River will be brought into compliance with the Surface Water Quality Standards by 2005.

. . .

5 Clean Methods refers to the newer metals sampling protocols that greatly reduce the contamination and consequent false positives associated with historical metals data.

6 page 69 of the 305(b) report

7 Appendix E. Determination that phosphorus is neither limiting primary production nor causing impairment of uses in the Whippany River

8 Appendix C. Memorandum of Agreement between U.S. EPA Region II and NJDEP. Schedule to Establish Total Maximum Daily Loads for all Waterbodies Listed 1 in the State of New Jersey's 1998 303(d) List. Signed May 1999.

9 Killam Associates. August 1997. Whippany River Watershed Project, Storm Event Water Quality and Streamflow Data. Storm #1: November 8-9, 1996; Storm #2: April 12, 1997; Storm #2a: July 9, 1997.
Killam Associates. October 1998. Whippany River Watershed Project, Storm Event Water Quality and Streamflow Data. Storm #3: June 12, 1998.

10 NJDEP. Steady State high and low flow water quality data. Oct. 4-6, 1994, April 26-28, 1995, and Sept. 5-7, 1995. Whippany River Watershed Project.

11 Omni Environmental Corporation. July 1999. Whippany River Watershed Project, Stormwater Model Calibration and Verification Report.
12 Cabelli, V. 1989. Swimming-associated illness and recreational water quality criteria. Wat. Sci. Tech. 21:17.

APPENDIX A

Whippany River Watershed 1 Municipal Dischargers

NJPDES #	FACILITY NAME	CURRENT FLOW MGD)	RECEIVING STREAM
NJ0024902	Hanover SA 2	1.9	Whippany River
NJ0024911	Morris Twp--Butterworth	1.6	Whippany River
NJ0024970	Parsippany--Troy Hills SA 3	12.3	Whippany River
NJ0025496	Morristown Town STP 4	2.5	Whippany River
NJ0026689	NJDHS--Greystone Psych Hosp 5	0.32	Whippany River
NJ0026751	Saint Mary's Abbey 6	0.011	trib to Whippany River

. . .

1 List complied by the Department's Division of Water Quality in June 1999 and November 1999.

2 Hanover S.A. is currently implementing the interim total phosphorus reduction plan via the January 20, 2000 Settlement Agreement with the Department.

3 TMDL calculation did not include this facility because it discharges at the extreme downstream point in the watershed and was not included in the model domain.

4 According to the Department's Division of Water Quality, Morristown, via a treatment plant upgrade, has brought their plant into compliance with their 1.0 mg/l phosphorus permitted effluent limitation and as such is not subject to any of the requirements of this plan.

5 Greystone is scheduled to cease discharge; therefore an existing effluent equivalent calculation is not necessary for this sewage treatment plant.

6 On December 31, 1994, an administrative consent order (ACO) was signed by the Department and by the owners/operators of the St. Mary's Abbey Delbarton School Sewage Treatment Plant (STP). That ACO provides for either the construction of a sewer extension to convey all wastewater generated by the STP to the Township of Morris Butterworth STP or upgrade the existing STP to meet final effluent limitation of the associated NJPDES Discharge Permit. The owners/operators of the STP have chosen to convey their wastewater to the Butterworth STP. The ACO includes an enforcement construction compliance schedule for construction of the conveyance system as well as a

requirement by the owner/operator to evaluate and provide the Department with a written report summarizing the efforts taken to reduce the use of phosphate containing cleaning/washing materials within the Delbarton School.

APPENDIX B

Existing Effluent Quality Calculations

Existing NJPDES Regulations at *N.J.A.C. 7:14A*, Subchapter 13, describe how the Department will calculate seasonal effluent limitations for phosphorus in the Whippany River using existing effluent quality.

N.J.A.C. 7:14A-13.8 CALCULATION OF EFFLUENT LIMITATIONS USING EXISTING EFFLUENT QUALITY

(a) Effluent limitations based on existing effluent quality shall be calculated according to the following procedure:

1. The maximum projected effluent concentration shall be calculated in accordance with the statistical method contained in the USEPA TSD, as amended and or supplemented, unless the permittee demonstrates that the method in the TSD is not applicable and that an alternative statistical method more accurately estimates the maximum projected effluent concentration.

i. The following conditions apply:

(1) If at least 10 data points are available, a site-specific coefficient of variation shall be determined.

(2) If fewer than 10 data points are available the permit shall require monitoring and include a reopener clause to include existing effluent quality limitations based on 10 or more data points.

(3) The 95 percent confidence interval and the 95 percent probability basis shall be used.

ii. Effluent data generated during a documented facility upset, or other unusual event which has been identified and appropriately remedied by the permittee, may be eliminated when determining effluent limitations based on existing effluent quality;

2. The maximum daily limitation shall be set equal to the maximum projected effluent concentration; and

3. The average monthly limitation shall be calculated from the maximum daily limitation according to the procedure described in *N.J.A.C. 7:14A-13.6*, using the sampling frequency required in the discharge permit. If the required sampling frequency is once per month or less, an average monthly limitation may be eliminated for that pollutant or pollutant parameter.

(b) Where an interim effluent limitation is required in accordance with *N.J.A.C. 7:14A-13.11* for the time period prior to the effective date of a final effluent limitation, limitations reflecting existing effluent quality shall be calculated in accordance with (a) above.

N.J.A.C. 7:14A-13.9 SEASONAL EFFLUENT LIMITATIONS

(a) Seasonal water quality based effluent limitations for continuous discharges may be developed in accordance with the following:

1. The permittee shall submit the necessary water quality studies that address any effects or potential effects on nutrient cycling and potential or actual adverse biological impacts in other waterbody segments related to nutrients.

2. The seasonal limitations shall be developed from a seasonal TMDL or a seasonal site-specific allocation for the

specific pollutant(s) or pollutant parameter(s) which addresses critical conditions applicable to each season for which an effluent limitation is requested.

3. Seasonal water quality based effluent limitations shall be developed only for the following parameters and groups of parameters and only insofar as the warm weather limitations cannot be achieved due to decreases in biological treatment efficiency during cold weather:

i. Parameters affecting dissolved oxygen dynamics in the receiving stream;

ii. Nutrients, including phosphorus and nitrogen; and

iii. Ammonia N, to protect against toxic effects in the receiving water.

4. Except as specified at (a)5 below , seasonal water quality based effluent limitations shall be developed for two seasons in each year.

5. Seasonal WLAs or site specific allocations may be developed for shorter periods of time including more than two seasons, when the United States Geological Survey provides a reliable estimate of applicable stream design flows from a gauging station located in the vicinity of the discharge location.

APPENDIX C

Memorandum of Agreement between NJDEP and USEPA Region 2 to develop TMDLs

Memorandum of Agreement between U.S. Environmental Protection Agency Region II and New Jersey Department of Environmental Protection

Schedule to Establish Total Maximum Daily Loads for all Waterbodies Listed on the State of New Jersey's 1998 303(d) List

I. Background:

1. The total maximum daily load (TMDL) program is statutorily authorized by Section 303(d) of the Clean Water Act, 33 U.S.C. § 1313(d). CWA § 303(d) and its implementing regulations found at 40 C.F.R. § 130.7, provide for:

   A. Identification of waters for which applicable technology-based effluent limitations and other controls are not stringent enough to implement water quality standards;
   B. Establishment of a priority ranking for water quality-limited segments (WQLSs) still requiring TMDLs; and,
   C. Establishment of TMDLs, as necessary, for pollutants responsible for non-attainment of water quality standards in WQLSs.

2. This Memorandum of Agreement (MOA) includes a schedule to

establish TMDLs for all WQLSs still requiring TMDLs, as identified in the NJDEP 1998 § 303(d) list; and procedures by which TMDLs will be established, as necessary, for WQLSs identified on subsequent § 303(d) lists.

II. Purpose:

3. The purpose of this MOA is to set forth the basic covenants and commitments between EPA Region II and the NJDEP, with respect to the development of a schedule to establish TMDLs for all WQLSs included on the New Jersey 1998 § 303(d) list, and procedures by which TMDLs will be established, as necessary, for WQLSs identified on subsequent § 303(d) lists.

4. EPA Region II and the NJDEP hereby agree to maintain the high level of cooperation, coordination, and technical support necessary to assure the successful and effective establishment of TMDLs in accordance with the schedule below.

NJDEP and EPA Responsibilities:

5. Under this MOA, NJDEP agrees to establish TMDLs for all waterbodies included on the New Jersey 1998 § 303(d) list, or provide the information necessary to remove waterbodies from the list, as described in the schedule below. TMDLs established by NJDEP shall, at a minimum, include: an explanation of the procedures and assumptions used to develop the TMDL; the TMDL calculation; aggregate and individual waste load allocation (WLA); an aggregate load allocation (LA) or percent load reduction; and, a margin of safety (MOS).

6. The NJDEP shall provide a public comment period and respond to all comments received during the public comment period before submitting State established TMDLs to EPA for its review and decision. NJDEP and EPA shall work together to assure the TMDLs are consistent with federal and State requirements prior to being public noticed and prior to being issued as final TMDLs.

7. In fulfillment of New Jersey's responsibilities under its Continuing Planning Process, the NJDEP shall incorporate the final EPA approved/established TMDL/WLA/LA into its current Areawide Water Quality Management Plan(s). The final EPA approved/ established TMDL shall be the governing TMDL, and as such shall be included in NJDEP's current Areawide Water Quality Management Plan(s), regardless of any TMDL previously

incorporated by NJDEP into its current Areawide Water Quality Management Plan(s).

8. NJDEP shall, in accordance with the following schedule, establish TMDLs for all WQLSs listed on its 1998 § 303(d) list, or propose de-listing of specific WQLSs, in accordance with the applicable provisions of § 303(d) of the Clean Water Act, and its implementing regulations found at 40 C.F.R. § 130.7 and N.J.A.C. 7:15-5 and 6. NJDEP shall develop a proposed de-listing process for New Jersey and submit it to EPA for approval. EPA and NJDEP shall work together to develop mutually acceptable de-listing procedures which meet both federal and State requirements.

9. All future § 303(d) lists shall include a proposed schedule for TMDLs for all WQLSs contained on those lists and shall also include any changes or updates to the schedule for TMDLs contained in this MOA. These lists will identify any "fast-track" TMDLs. ("Fast-track TMDLs" are any individual TMDLs that can be completed sooner than other TMDLs in a given watershed.) Once EPA has approved the subsequent § 303(d) list and has determined that the updated TMDL schedule submitted with the list is consistent with the expectations of national guidance, the schedule contained in this MOA shall be considered modified. The schedule contained in this MOA or as modified by a subsequent § 303(d) lists shall be incorporated into the appropriate Performance Partnership Agreement between NJDEP and USEPA Region II.

10. EPA shall, as necessary, provide program and legal guidance and technical support necessary to assist NJDEP in meeting the following schedule for the establishment of TMDLs for all WQLSs included on the New Jersey 1998 § 303(d) list.

11. EPA shall review and issue its decision on all final TMDLs submitted by the State within thirty (30) days of submittal.

IV. Schedule for Establishment of TMDLs:

12. As specified below, NJDEP agrees to: public notice; respond to comments received during the public comment period; establish; and submit to EPA, TMDLs for all WQLSs included on the New Jersey 1998 § 303(d) list no later than the dates listed below:

A.1. By June 30, 1999:
. New York/New Jersey Harbor Metals (Cu, Ni, & Pb) TMDLs:
EPA shall, in cooperation with NJDEP, public notice, respond to comments received during the public comment period and establish Phase II Metal (Cu, Ni, & Pb) TMDLs, as necessary, for the New York/New Jersey Harbor.

A.2. By September 30, 1999:
. Delaware Estuary Volatile Organics TMDLs:
NJDEP shall in cooperation with the Delaware River Basin Commission (DRBC), public notice; respond to comments received during the public comment period; establish; and submit to EPA, TMDLs, as necessary, for Volatile Organics in the Delaware Estuary.

A.3. By December 31, 1999:
NJDEP shall: public notice; respond to comments received during the public comment period; establish; and submit to EPA, TMDLs, as necessary, for the following watershed by December 31, 1999:
. Whippany River Watershed

B. By December 31, 2000:
NJDEP shall: public notice; respond to comments received during the public comment period; establish; and submit to EPA, Basic TMDLs*, as necessary, for the following two (2) waterbodies identified as requiring Basic TMDLs in its 1998 § 303(d) list, by December 31, 2000:
. Strawbridge Lake (Burlington County)
. Sylvan Lake (Burlington Township, Burlington County)
* Basic TMDLs are TMDLs for water quality-limited segments for which basic
TMDLs are appropriate (see N.J.A.C. 7:15-7). The term Basic TDMLs only
applies to the above two waters listed on the NJDEP 1998 § 303(d) list.

C.1. By June 30, 2002:
NJDEP shall: public notice; respond to comments received during the public comment period; establish; and submit to EPA; TMDLs, as necessary, for the following watersheds by June 30, 2002:

. Rancocas, Cooper Rivers & Pennsauken Creek
. Manasquan River
. Pompton, Ramapo, Pequannock, & Wanaque Rivers
. Lower Passaic River (non-tidal)
. Upper Passaic & Rockaway Rivers

C.2. By September 30, 2002:
. Delaware Estuary Dissolved Oxygen TMDLs:
NJDEP shall, in cooperation with the DRBC, public notice; respond to comments received during the public comment period; establish; and submit to EPA, TMDLs for Dissolved Oxygen in the Delaware Estuary by September 30, 2002.

D.1. By June 30, 2003:
NJDEP shall: public notice; respond to comments received during the public comment period; establish, and submit to EPA, TMDLs, as necessary, for the following watersheds by June 30, 2003:
. Millstone River
. North & South Branch of the Raritan River
. Saddle River
. Hackensack River & Pascack Creek
. Raritan and South Rivers & Lawrence Brook
. Walkill, Pochuck, and Papakating Creeks
. Lower Delaware Tributaries

D.2. By September 30, 2003:
. Delaware River/Estuary Metals, PCBs DDT & Derivatives TMDLs:
NJDEP shall, in cooperation with DRBC, public notice; respond to comments received during the public comment period; establish; and submit to EPA, TMDLs for Metals, PCBs, DDT & Derivatives in the Delaware Estuary by September 30, 2003.

E. By June 30, 2004:
NJDEP shall: public notice; respond to comments received during the public comment period; establish; and submit to EPA, TMDLs, as necessary, for the following watersheds by June 30, 2004:
. Upper Delaware River Tributaries
. Cohansey River

. Monmouth Watershed

. Maurice River

* EPA and NJDEP are exploring the opportunity to complete the Maurice River

TMDLs for pathogens and phosphorus sooner under EPA contract.

F.1. By June 30, 2005:

NJDEP shall: public notice; respond to comments received during the public comment period; period; establish; and submit to EPA, TMDLs, as necessary, for the following watersheds by June 30, 2005:

. Elizabeth, Rahway & Woodbridge Rivers

. Crosswicks Creek

F.2. By September 30, 2005:

. Delaware River/Estuary Fecal Coliform TMDLs:

NJDEP shall, in cooperation with DRBC, public notice; respond to comments received during the public comment period; establish; and submit to EPA, TMDLs for Fecal Coliform in the Delaware Estuary by September 30, 2005.

G.1. By June 30, 2006:

NJDEP shall: public notice; respond to comments received during the public comment period; establish; and submit to EPA, TMDLs, as necessary, for the following watersheds by June 30, 2006:

. Mullica & Wading Rivers

. Great Egg Harbor, Tuckahoe River

G.2. By June 30, 2006:

. Barnegat Bay Watershed TMDLs:

NJDEP shall, in cooperation with the Barnegat Bay National Estuary Program, public notice; respond to comments received during the public comment period; establish; and submit to EPA, TMDLs for the Barnegat Bay Watershed, by June 30, 2006.

H.1. By June 30, 2007:

NJDEP shall: public notice; respond to comments received during the public comment period; establish; and submit to EPA, TMDLs, as necessary, for the following watersheds by June 30, 2007:

. Central Delaware Tributaries

. Cape May Watersheds

H.2. By June 30, 2007:

. NY/NJ Harbor PCBs; Dioxins; PAHs; Pesticides; Mercury; Dissolved Oxygen; and Fecal Coliform TMDLs:

. NJDEP shall, in cooperation with the New York/New Jersey Harbor National Estuary Program, public notice; respond to comments received during the public comment period; establish; and submit to EPA, TMDLs for PCBs; Dioxins; PAHs; Pesticides; Mercury; Dissolved Oxygen; and Fecal Coliform in the NY/NJ Harbor by June 30, 2007.

. Within 9 months of the date that this MOA is signed by both parties, NJDEP with assistance from EPA, and the Harbor Estuary Program shall develop a schedule, including milestones, for the establishment of the above TMDLs. This schedule may shorten but will not extend the time frame for TMDL development in NY/NJ Harbor. Once agreed upon by both NJDEP and EPA, any accelerated schedule for establishment of TMDLs in NY/NJ Harbor will be incorporated into this MOA.

V. Legal Effect:

13. This MOA creates no cause of action against EPA or NJDEP. In addition, the execution and implementation of this MOA does not constitute an explicit or implicit agreement by either EPA or NJDEP to subject itself to the jurisdiction of any federal or state court. Nor shall this MOA be construed as an admission by EPA or NJDEP that either failed to implement the provisions of CWA section 303(d). Nor shall this MOA be construed as creating any right or benefit, substantive or procedural, enforceable in law or in equity, by any person or entity against EPA or NJDEP. This MOA shall not create any right to judicial review involving the compliance or noncompliance with this MOA.

14. Nothing in this MOA shall be construed to require actions by EPA or NJDEP that are inconsistent with State, or federal laws or regulations or any court order.

VI. Modification

15. EPA Region II and NJDEP understand that the covenants and commitments made pursuant to this MOA are based upon statutes and regulations currently in effect. Changes to such laws and/or

regulations may require modification to this MOA. EPA and NJDEP also understand that this MOA may be modified in accordance with actions taken by courts of law. Finally, EPA and NJDEP may jointly modify this agreement to reschedule TMDL development to the extent that the overall schedule does not increase and that the delay of any one TMDL project is balanced by the advancement of another TMDL project. No modification to this schedule shall be necessary for completion of TMDLs in advance of this schedule.

VII. Termination

16. This MOA, and all responsibilities and obligations arising herein shall remain in effect until the parties have carried out such obligations and responsibilities. However, a change in the law or issuance of a court order may also give rise to termination of this MOA. Thus, either party may submit a written notice of termination to the other party within 30 days of any court order or change in the law requiring termination of this MOA. In addition, either party may submit a written notice of termination when all responsibilities and obligations required by this MOA and the schedule herein, have been completed by both parties.

VIII Effective Date

17. This MOA shall become effective on the date it is last signed by the parties below.*

For the New Jersey Department of Environmental Protection:
By: Robert C. Shinn, Jr., Commissioner
New Jersey Department of Environmental Protection
signed April 17, 1999*

For the U.S. Environmental Protection Agency, Region II:
By: Jeanne M. Fox, Regional Administrator
U.S. Environmental Protection Agency, Region II
signed May 10, 1999*

*signatures are shown on the original executed document

APPENDIX D

Potential Low Cost Phosphorus Control Alternatives

1. Reduction of MLSS (lowering of sludge age) in activated sludge

system by increased sludge wasting.

2. Evaluation of recycle streams for minimization of phosphorus load.

Streams to be evaluated:

a. Anaerobic digester supernatant

b. Sludge thickening overflow and/or filtrate

c. Sludge storage (aerobic digester) supernatant/decant liquor

d. Filter backwash

e. Ash pond supernatant for incineration facilities

Evaluation items:

f. Determination of concentration, load and composition(soluble versus particulate P)

g. Evaluation of relative importance of the recycle steam in the phosphorus mass balance

h. Means for reducing phosphorus release/recycle in the side streams by:

(1) Chemical addition (Pho-strip type process)

(2) aeration of sludge

(3) reduction of storage time

(4) other modifications in operation of sludge processing train

3. Evaluation of Passaic Basin contract facilities sludge processing and disposal locations to protect upstream reaches of the water-shed from

receiving phosphorus loads from downstream facilities through sludge disposal at upstream facilities.

a. Evaluate importance and impact of side streams from sludge processing

b. Evaluate impact of septage acceptance

c. Evaluate processing and disposal sites location potential impact on water quality

d. Evaluate significance of sludge, septage and liquid waste imported to the Passaic Basin

e. Evaluate handling of transported sludge

4. Reduction of particulate phosphorus discharged in effluent by increasing efficiency of capture of P-bearing solids by:

a. Evaluate sludge blanket depth impact on effluent solids

b. Improved performance of final clarifiers by addition of polymer or coagulant

c. Attention to sludge bulking/foaming problems and associated losses of solids in final clarifier effluent

d. Addition of small amounts of polymer or coagulant to tertiary filters

Evaluate potential for improved clarifier performance by installation of:

e. density current baffle

f. flocculating center well

g. spiral rakes

5. Evaluate potential for achieving enhanced biological phosphorus through low costs means such as conversion of existing tankage to create anaerobic/aerobic zones within the treatment train.

6. Evaluation of sources of phosphorus in wastewater.

a. Verify if influent concentration indicates presence of phosphorus sources other than human wastes

b. Perform evaluation of potential phosphorus contributors such as: major industries, commercial laundries, and facilities with large laundries such as hospital, schools and other institutions

c. Use of phosphates by water supply company for corrosion control

d. Other potential sources

7. Nonpoint source control through cooperative efforts with county and municipalities.

8. Evaluate control of inflow/rainfall induced infiltration in the areas

with potential high phosphorus concentration (farms, animal feedlots, stables, intensively fertilized agricultural and landscaped areas).

APPENDIX E

Determination that phosphorus is neither limiting primary production nor causing impairment of uses in the Whippany River

New Jersey Department of Environmental Protection

The current Surface Water Quality Standards (*N.J.A.C. 7:9B-1.14(c)*) state that "phosphorus as total P shall not exceed 0.1 [mg/l] in any stream, unless it can be demonstrated that total P is not a limiting nutrient and will not otherwise render the waters unsuitable for the designated uses." The SWQS further state as a nutrient policy (*N.J.A.C. 7:9B-1.5(g)*2): "Except as due to natural conditions, nutrients shall not be allowed in concentrations that cause objectionable algal densities, nuisance aquatic vegetation, or otherwise render the waters unsuitable for the designated uses." The following lines of evidence, taken together, sufficiently demonstrate to the Department that phosphorus in the Whippany River is not a limiting nutrient. Furthermore, since phosphorus is not otherwise rendering the Whippany

River unsuitable and the Nutrient Policy is supported in the Whippany River, the numerical Total Phosphorus Criterion of 0.1 mg/l is not applicable in the Whippany River.

The net growth rate of phytoplankton populations is determined by their gross growth rate minus the rates of various losses, including dilution, sedimentation, physiological death, and grazing. Populations can be limited by their growth rates, one or more of their loss terms, or both; therefore, population increases can occur at both low and high growth rates. Low phytoplankton abundance does not necessarily mean that the growth rate is limited in any way. Phytoplankton growth rate is a function of light, temperature, and nutrient supply, and is often expressed as:

Growth = Growthmax x f(Light)x f(Nutrients)x f(Temp)x [Phyto]

where: Growth = phytoplankton production rate (mg/l/day);

Growthmax/ = maximum relative growth rate (per day)

f(Light = limitation due to light intensity (dimensionless)

f(Nutrients) = limitation due to nutrients (dimensionless)

f(Temp) = limitation due to temperature (dimensionless)

[Phyto] = phytoplankton biomass concentration (mg/l)

The light, nutrient, and temperature limitation factors are dimensionless numbers from 0 to 1. The nutrient limitation factor is determined by the nutrient that is least available relative to the requirements of a particular phytoplankton population.

Algal cells require many elements in relatively fixed proportions in order to reproduce. While several "micronutrients," especially iron and cobalt, 7 may indeed be limiting primary production in some systems, discussions of nutrient limitation usually focus on the "macronutrients," namely nitrogen, phosphorus, and silica (for diatoms). Often the ratio between the available forms of nitrogen to phosphorus in the water column is used to help determine which nutrient might be limiting. If the ratio is higher than the optimum, one can conclude that nitrogen is not limiting; if the ratio is lower than optimum, one can conclude that phosphorus is not limiting. 8 However, phytoplankton communities may consist of several populations each with different optimal N:P ratios, which can range among phytoplankton species from 3 to 40 on a concentration basis. 9 Figure 1 shows the ratios of available forms of nitrogen to phosphorus (TIN/TOP 10) at stations in the Whippany River along with total phosphorus concentrations at the same stations.

Click here for

APPENDIX B

New Jersey Department of Health and Senior Services
New Jersey Medicaid Program
Title XIX (Medicaid)

PARTICIPATION AGREEMENT
BETWEEN

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES

AND

(Medical Day Care Program - Adults)

Name and Address of Facility	State License Number
	Medicaid Provider Number

This contract, made and entered into by and between the Department of Health and Senior Services, hereinafter designated as the Department, and the above-named Facility, a provider of services, hereinafter designated as the Facility. Witnesseth:

WHEREAS, various persons eligible for benefits under the New Jersey Medicaid Program are in need of medical day care, as more specifically set forth in Program regulations and guidelines; and

WHEREAS, Section 1902(a)(27) of Title XIX of the Social Security Act requires states to enter into a written agreement with every person or institution providing services under the State Plan for medical Assistance (Title XIX); and

WHEREAS, pursuant to N.J.S.A. 30:4D-1 et seq., and the Reorganization Plan 001-1996, the Department administers this segment of the Medicaid Program and is authorized thereunder to take all necessary steps for the proper and efficient administration of the New Jersey Medicaid Program; and

WHEREAS, to participate in the New Jersey Medicaid Program, a Medical Day Care Facility must:
(1) be licensed under the laws of New Jersey as a non-residential Adult Day Health Care Center by the Department;
(2) be currently meeting, on a continuing basis, standards for licensure;
(3) be administered by a qualified health professional;
(4) meet on a continuing basis Federal and State standards for participation and, more specifically, Medical Day Care standards in Title XIX of the Social Security Act; and
(5) accept the terms and conditions of participation set out herein.

NOW, THEREFORE, it is agreed, by both parties, as follows:

A. FACILITY AGREES:
1. That it will render all services which are required for participation in the Medical Day Care program for adults, including at a minimum: medical services, nursing services, social services, transportation, personal care services, dietary services, therapeutic activities, pharmaceutical and rehabilitation services.

2. That it will accept the Medical Day Care rate approved under the Medicaid Program as payment in full and will not make any additional charges to the participant or others on his behalf for Medicaid-covered services, except for authorized physical therapy and speech-language therapy which are not included in the per diem reimbursement and must be billed separately. Medical Day Care Centers for adults will be reimbursed in accordance with methods and procedures set forth in State regulations.

image

Upstream of the Butterworth municipal discharge, the data clearly demonstrate that nitrogen is not limiting. From Jefferson Road downstream it appears unlikely that phosphorus is limiting. Generally, stations with phosphorus concentrations near the Surface Water Quality Criterion of 0.1 mg/l have nutrient concentration ratios indicating that neither nitrogen nor phosphorus limitation is unlikely; stations with phosphorus concentrations well above the Surface Water Quality Criterion have nutrient concentration ratios that indicate phosphorus limitation is unlikely.

While TIN/TOP ratios can yield valuable insight, especially by demonstrating if a nutrient is clearly not limiting, they can never demonstrate that a nutrient is limiting. The concentration of the available nutrient must also be low enough to limit growth rate. For instance, a high TIN/TOP ratio could be used to rule out nitrogen limitation, since available phosphorus would be lower relative to phytoplankton requirements than available nitrogen. However, if the phosphorus is present in excess concentrations relative to the amount needed for growth, it is still not limiting growth; in other words, the concentration of available nutrients is sufficient to allow the phytoplankton to grow at a rate independent of the nutrient concentration. Such is the case in the Whippany River. While many phytoplankton communities and species have such high affinities for N and P that nutrient limitation does not occur at current analytically detectable levels 11, a general rule of thumb is that available nitrogen and phosphorus concentrations less than 0.015 mg/l and 0.002 mg/l, respectively, would be considered limiting 12. Concentrations measured in the Whippany River have not come within an order of magnitude of what is typically considered limiting levels. Figure 2 shows TIN and TOP levels in the Whippany plotted against one another. Not only are the high levels of available nutrients clearly shown, but also the consistent and tight correlation between TIN and TOP demonstrates that one nutrient is not being disproportionately affected by biological processes. If one of the nutrients were limiting algal growth, one would expect it to be drawn down in concentration relative to the other during periods of heavy growth. Such is clearly not the case.

MEDICAL DAY CARE PROGRAM PARTICIPATION AGREEMENT, Continued

Click here for

Name and Address of Facility	Medicaid Provider Number

3. That it will promptly initiate and terminate billing procedures pursuant to applicable regulations, when individuals covered under this Program enter or leave the Facility or are assessed at a different level of care.

4. That it will limit billing procedures under this Program to those authorized participants and for those days on which Medical Day Care services have been received.

5. That it will make available to the appropriate State and/or Federal personnel or their agents, at all reasonable times and places in New Jersey, all necessary records including:

   a. Medical records as required by Section 1902(s)(27) from the Social Security Act of Title XIX and any amendments thereto;

   b. Records of all treatment, drugs, and services for which vendor payments are to be made under the Title XIX programs, including the authority for and the date of administration of such treatments, drugs, or services;

   c. Documentation in each participant's records which will enable the Department to verify that each charge is due and proper prior to payment;

   d. Financial records of the Facility, including data necessary to determine appropriate reimbursement rates; and

   e. All other records as may be found necessary by the Department to be in compliance with Federal or State law, rule, or regulations promulgated by the United States Department of Health and Human Services or by the Department.

6. That it will comply with the disclosure requirements specified in 42 CFR 455.100 through 42 CFR 455.106;

7. That the maximum number of daily participants will be in accordance with the Department's regulations and licensure standards.

8. That it will cooperate fully in permitting and assisting representatives of the Department to make assessments and evaluations of services needed by and provided to participants in general, and of individual participants who are recipients of the Medical Day Care services.

9. That it will secure and arrange for other health services as may be available for Medicaid patients pursuant to program regulations.

10. That it will comply with State and Federal Medicaid laws, and rules and regulations promulgated pursuant thereto.

11. That it will cooperate fully in permitting and assisting representatives of the Department in determining continuing conformity with the Federal and State standards applicable to non-residential Medical Day Care Facilities.

12. That it will notify the Provider Enrollment unit, within five working days, subsequent to any change in status of its license to operate as issued by the Department.

13. That it will notify the Department within five (5) working days, subsequent to any professional staff changes.

14. That it will notify the Medical Day Care participants, in writing, thirty (30) days prior to the Facility's termination as a Medicaid provider.

15. That the Facility may terminate its participation in the Medicaid Program upon a minimum of sixty (60) days written notice to the Department.

image

Further insight can be obtained by examining the water quality model of the Whippany River developed by the Department in conjunction with the Whippany River Watershed Technical Advisory Committee (TAC). As mentioned previously, the nutrient limitation terms, calculated each time step, are dimensionless numbers ranging from zero to one. They are a function of available nutrient concentrations 13 and a phytoplankton coefficient called the half-saturation constant, defined as the nutrient concentration required to achieve half of the maximum growth rate under certain conditions. The generalized Monod relationship is shown in Figure 3. The calibrated and verified Whippany River Watershed model has been peer reviewed and approved by the TAC. Available nitrogen and phosphorus half-saturation values at various locations in the river were determined by calibration to vary from 0.01 to 0.025 mg/l and 0.001 to 0.005 mg/l, respectively, solidly within the range found in literature. Nutrient limitation factors near 1.0 indicate that phytoplankton growth rate is not being reduced due to limited nutrient supply; in other words, nutrient limitation is not occurring. Figure 3 shows the nutrient limitation factors calculated by the model at each sampling station during the three sampling events. According to the model, nutrient limitation is not important anywhere, and is nonexistent at locations where phosphorus is elevated in concentration.

MEDICAL DAY CARE PROGRAM PARTICIPATION AGREEMENT, Continued

Click here for

Name and Address of Facility	Medicaid Provider Number

16. To comply with the requirements of Title VI of the Civil Rights Acts of 1964 and Section 504 of the Rehabilitation Act of 1973 and any amendments thereto; and Section 1909 of P.L. 92-603, Section 242(c) which makes it a crime and sets the punishment for persons who have been found guilty of making any false statement or representation of a material fact in order to receive any benefit or payment under the Medical Assistance Program. (The Department is required by Federal regulation to make this law known and to warn against false statements in an application/agreement or knowing a false statement of fact used in determining the right to a benefit, or in converting a benefit, from this program, to the use of any persons other than one for whom it was intended).

17. That breach or violation of any one of the above provisions shall make this entire agreement subject to immediate cancellation at the Department's discretion, in keeping with the procedures adopted by the Department in accordance with the New Jersey Administrative Procedures Act.

18. That it will immediately provide the Department with written notice of any change in ownership and/or operation of the Facility, including changes in leases, officers and directors, stock ownership or sale of the Facility, when:

Corporate (Profit)

a. There is acquisition of or transfer of ownership through purchase, contract, donation, gift, stock option, etc., of 25% or more of a corporation's outstanding stock (preferred or common).

b. There is acquisition of the physical or intangible assets of the Facility by a newly formed or existing corporation.

Partnership

a. There is acquisition of or transfer of ownership of 10% or more of the existing partnership's total capital interest.

b. There is acquisition of the physical or intangible assets of the Facility by a newly formed or existing partnership.

Proprietorship

a. There is purchase of the physical or intangible assets of the Facility.

Corporation (Non-Profit)

a. There is a change in the officer, trustee, directors or board members of the Facility.

B. DEPARTMENT AGREES:

1. That it will pay for authorized services provided by the Facility in keeping with the availability of State appropriations, on the basis of care required by the eligible individual as determined by the Department acting under the applicable regulations, but in no event will payment be made for any individual determined not to require Medical Day Care services.

2. That it will reimburse the Medical Day Care Center through the appropriate fiscal agent in accordance with methods and procedures set forth in State regulations.

3. That it will make such payments, in accordance with applicable laws and regulations, as promptly as is feasible after a proper claim is submitted and approved.

image

Taken together, these lines of evidence are more than sufficient to demonstrate that the Whippany River is not currently phosphorus limited.

It is important to recognize that just because phosphorus is not currently limiting does not automatically mean the numerical phosphorus criteria do not apply. If a waterbody is impaired due to excessive primary production, reducing phosphorus so that it becomes limiting is often the best strategy even when phosphorus is in excess 14. The numerical phosphorus criteria apply unless it can be demonstrated that total P is not a limiting nutrient and will not otherwise render the waters unsuitable for the designated uses. Furthermore, Nutrient Policy #2 must be satisfied.

Nutrient Policy #2 states: "Except as due to natural conditions, nutrients shall not be allowed in concentrations that cause objectionable algal densities, nuisance aquatic vegetation, or otherwise render the waters unsuitable for the designated uses." The Whippany River has been studied extensively and does not suffer from objectionable algal densities or nuisance aquatic vegetation 15. Furthermore, oxygen levels are not depressed below the Surface Water Quality Criteria even in shallow impoundments such as Speedwell Lake 16. Broad consensus was reached among the Public Advisory Committee members that despite the high nutrient levels in the Whippany River, uses do not appear to be impaired due to eutrophication.

In conclusion, it has been demonstrated to the Department's satisfaction that:

1. Total Phosphorus is not a limiting nutrient in the Whippany River;

2. Total Phosphorus has not rendered the Whippany River unsuitable for the designated uses;

3. There are not objectionable algal densities in the Whippany River; and

4. There is not nuisance aquatic vegetation in the Whippany River.

Available data and analysis of nutrient concentrations in the Whippany River clearly lead to the conclusion that no impairment of the River's designated uses are caused by excessive primary production. This analysis further shows that algal growth is not phosphorus limited in the River. Accordingly, the numerical total phosphorus criterion of 0.1 mg/l does not apply to the Whippany River. Thus, the Whippany River is in compliance with the Surface Water Quality Standards with respect to phosphorus.

. . .

7 Hecky, R.E. and P. Kilham. 1988. Nutrient limitation of phytoplankton in freshwater and marine environments: A review of recent evidence on the effects of enrichment. Limnol. Oceanogr. 33(4, part 2):796-822. Table 2.

8 Rhee, G-Yull. 1978. Effects of N:P atomic ratios and nitrate limitation on algal growth, cell composition, and nitrate uptake. Limnol. Oceanogr. 23(1):10-25.

9 Hecky, R.E. and P. Kilham. 1988. Nutrient limitation of phytoplankton in freshwater and marine environments: A review of recent evidence on the effects of enrichment. Limnol. Oceanogr. 33(4, part 2):796-822. Table 4.

10 TIN = Total Inorganic Nitrogen, including nitrite-nitrate and ammonia
TOP = Total Ortho Phosphorus

11 Hecky, R.E. and P. Kilham. 1988. Nutrient limitation of phytoplankton in freshwater and marine environments: A review of recent evidence on the

effects of enrichment. Limnol. Oceanogr. 33(4, part 2):796-822. pp. 801-802.
12 Lee, G.F. and A. Jones Lee. 1998. Determination of Nutrient Limiting Maximum Algal Biomass in Waterbodies. Report G. Fred Lee & Associates, El Macero, CA. 8pp.
13 While more sophisticated models use internal nutrient concentrations, they require an extensive amount of data. Like most water quality models that calculate algal growth, the Whippany River Watershed Model uses external (ambient) nutrient concentrations.
14 Lee, G.F. and R.A. Jones. 1988. The North American Experience in Eutrophication Control through Phosphorus Management, In: Proc. Int. Conf. Phosphate, Water and Quality of Life. Paris, France.
15 George Van Orden, Ph.D. Effects of Nutrients within the Whippany River. Letter to Sandra Cohen dated November 15, 1999.
16 NJDEP. 1995. Diurnal D.O. Data from Whippany River. Bureau of Freshwater and Biological Monitoring.

APPENDIX F

Whippany River Watershed Model Development

Introduction

Predictions of the fate and movement of dissolved constituents in rivers and estuaries are needed to understand the nature and scope of many water quality problems. The ability to make such predictions partially depends on the development of suitable numerical transport models. Fortunately, dissolved constituents are laterally well-mixed in many rivers and estuarine channels and, therefore, transport models that represent channels as one-dimensional entities are often adequate

The application of mathematical modeling techniques to water quality problems has proved to be a powerful tool in water resource management. As a diagnostic tool, it permits the abstraction of a highly complex real world. Realizing that no one can ever detail all the physical phenomena that comprise the natural world, the modeler attempts to identify and include only the phenomena, natural or man-made, that are relevant to the water quality problem under consideration. As a predictive tool, mathematical modeling permits the forecasting and evaluation of the effects of changes in the surrounding environment on water quality. Although engineering insight and political and socioeconomic concerns play important roles in water resource management, some water quality problems are of such a complex nature that the predictive capability of mathematical models provides the only real means for screening the myriad number of management alternatives.

It is important for a computer program to be very general in nature if it is to serve as the basis for the mathematical modeler. The program should be flexible enough to produce the modeler with the mechanisms to describe and provide input data for the geophysical morphology, the transport processes, and the transformation processes that go into the framework of the model. Transport processes, basically hydrodynamic in nature, include advection, turbulent diffusion, and, when spatial averaging is included, dispersion. Transformation (or reactive) process, which are the sources and sinks that act upon a particular water quality parameter, may be physical, chemical or biological.

Diffusion Analogy Flow Model (DAFLOW)

The model is designed to provide predictions of discharge and flow velocity using a minimum of field data and calibration. The model is designed to simulate flow in upland stream systems where the flow reversals do not occur and backwater conditions are not severe. If these two conditions are satisfied, the diffusion analogy form of the flow equations can be applied with acceptable accuracy even with minimal field data.

Branched Lagrangian Transport Model (BLTM)

A one-dimensional water-quality model based on the Lagrangian reference frame was previously developed for use in single-channel upland streams (Jobson 1980, Schoellhamer and Jobson 1986a, 1986b). Because of the accuracy and stability of this model, it has been generalized for use in a network of open channels with one-dimensional flow. BLTM may be useful in simulating transport of a conservative substance such as dye or reactions between water quality constituents in branched river systems, tidal canal systems, and deltaic channels.

The BLTM solves the convective-dispersion equation by using a Lagrangian reference frame in which the computational nodes move with the flow. The unsteady flow hydraulics must be supplied to the model and the constituent concentrations are assumed to have no effect on the hydraulics.

WASP5

The Chemostate modules regarding nutrients and DO related equations have been adapted for Whippany River Watershed Water Quality model.

The equations solved by WASP5 are based on the key principle of the conservation of mass. To perform the mass balance computations, the user must supply WASP5 with input data defining seven important characteristics:

.Simulation and output control

.Model segmentation

.Advective and dispersive transport

.Boundary conditions

.Point and diffuse source loads

.Kinetic parameter, constants, and time function

.Initial concentration

QUAL2E

The Temperature Module of Qual2e is adapted for Whippany River Model to account for the temperature response. The net energy flux passing the air-water interface (in Btu/ft 2-day) resulted from Hsn, the sum of net short-wave solar radiation flux, Han, net long-wave atmospheric radiation flux, Hb, outgoing long-wave back radiation flux, Hc, convective energy flux and He, energy loss by evaporation.

Model Theory

DAFLOW

One dimensional transport models based on the Lagrangian reference frame have been found to be very accurate and stable (McBride and Rutherford, 1984; Thomson and others, 1984; O'Neill, 1981; Jobson, 1980, 1987). The flow model is designed to be used in conjunction with a transport model to form a transport modeling system.

Diffusion Analogy

The differential equations derived by Saint Venant (1871) for one dimensional, unsteady flow are the theoretical basis for the diffusion analogy method. Assuming no lateral inflow, the saint-Venant equations for channel flow are

Continuity equation

$$\frac{\partial Q}{\partial X} + \frac{\partial A}{\partial t} = 0 \qquad \textbf{Equation 1}$$

Momentum equation

$$\frac{1}{g}\frac{\partial U}{\partial t} + \frac{U}{g}\frac{\partial U}{\partial X} + \frac{\partial Y}{\partial X} + S_f - S_o = 0 \qquad \textbf{Equation 2}$$

in which Q = volumetric rate of flow, A = area of flow, X = longitudinal distance along the channel, t = time, Y = depth of flow, U = average cross-sectional velocity, g = accerlation of gravity, S_f = friction slope, and S_o = bed slope.

If the acceleration terms $\frac{1}{g}\frac{\partial U}{\partial t} + \frac{1}{g}\frac{\partial U}{\partial t}$ are neglected, the resulting equation is referred to as the diffusion wave equation. The diffusion analogy method used here solves the diffusion wave form of the equations with some additional simplifying assumptions.

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Much geomorphic information suggests that, in and average sense, the cross-sectional area (A) of natural channels can be approximated by an equation of the form

$$A = A_1 Q_s^{A_2} + A_0 \qquad \textbf{Equation 3}$$

in which A_1 and A_2 are constants called the hydraulic geometry coefficient and hydraulic geometry exponent, respectively, for area, Q_s equal the normal discharge, and A_0 is the average cross-sectional area at zero flow.

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The normal discharge is defined as the steady state discharge that corresponds to a cross-sectional area of A. The value of A2 theoretically can range from 0 to 1 but its value is usually found to be about .66+0.1 (Leopold and Maddock, 1953l Leopold and Miller, 1956; Boning, 1974; Boyle and Spar, 19985; and Graf, 1986). Likewise, the width, W, can be approximated by an equation of the form

$$W = W_1 Q_s^{W_2}$$ **Equation 4**

in which W_1 and W_2 are the hydraulic geometry coefficient and exponent, respectively, for width.

Table 1 contains a summary of some observed hydraulic geometry exponent.

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For unsteady conditions the DAFLOW model assumes that discharge (Q) can be approximated by

For unsteady conditions the DAFLOW model assumes that discharge (Q) can be approximated by

$$Q = Q_s - D_f \frac{\partial A}{\partial X}$$ **Equation 5**

in which D_f is the change in discharge caused by a unit change in the area gradient called a wave dispersion coefficient.

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Considering the monoclonal rising wave illustrated in figure 1 moving down a rectangular channel of width W at a constant wave speed C. For a wave traveling downstream without changing shape, it is easily seen that

$$C = \frac{Q_{s2} - Q_{s1}}{A_2 - A_1} \approx \frac{\partial Q_s}{\partial A} \qquad \textbf{Equation 6}$$

Substituting equation 5 into equation 1 yields $\frac{\partial A}{\partial t} + \frac{\partial Q_s}{\partial A}\frac{\partial A}{\partial X} - D_f \frac{\partial^2 A}{\partial X^2} = 0$, which by use of equation 6 reduces to the diffusion form of the flow equation

$$\frac{\partial A}{\partial t} + C\frac{\partial A}{\partial X} - D_f \frac{\partial^2 A}{\partial X^2} = 0 \qquad \textbf{Equation 7}$$

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Equation 7 indicates that the mass of water per unit length of channel obeys the one dimensional, convective-diffusion equation.

Because the flow hydrograph is approximated by a series of steady-state discharge (Qs) called wave, it is convenient to transform equation 7 into an expression for normal discharge by use of equation 3 yields

$$\frac{\partial Q_s}{\partial t} + C\frac{\partial Q_s}{\partial X} - D_f \frac{\partial^2 Q_s}{\partial X^2} = 0 \qquad \textbf{Equation 8}$$

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Solution procedure

1. Equation 8 is first solved to determine the distribution of Qs (area) along the channel at the end of the time interval

2. The volume of water stored in each subreach of the river is determined using equation 3 and the distribution of Qs from step 1

3. The discharge out of each subreach is computed using the continuity equation

19. Initial Activity Plan	_____	_____
20. Activity Progress Notes	_____	_____
Every 90 days	_____	_____
21. Therapy Progress Notes	_____	_____
22. Discharge Plan	_____	_____
23. Emergency Provisions	_____	_____
24. Disaster Plan	_____	_____

Comments: Indicate deficient areas according to item number in preceding section.

_____
_____
_____
_____
_____

Team Recommendations to Facility:

_____
_____
_____
_____

Projected Revisit: _____

Facility Staff Present:

_____
_____
_____

_____
Medical Consultant

_____
RSN/RNS

_____
ASWS

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BLTM's One-Dimensional Transport Theory

In the Lagrangian reference frame, the continuity of mass equation is

$$\frac{\partial C}{\partial t}=\frac{\partial}{\partial \xi}\left(D\frac{\partial C}{\partial \xi}\right)+S+\Phi+K\left(C-CR\right)$$ **Equation 9**

in which C is concentration, t is time, D is longitudinal dispersion coefficient, K is rate of production of the constituent, CR is the equilibrium concentration (that is, the concentration at which the internal production ceases), Φ is the rate of change in concentration due to tributary inflow, S is the rate of production of concentration, which is independent of the concentration (zero-order production rate) , and ξ is the Lagrangian distance coordinate given by

$$\xi=x-x_o-\int_{t_o}^{t}u\,dt'$$ **Equation 10**

in which x is the Eulerian (stationary) distance coordinate along the river, u is the cross-sectional mean stream velocity, and x is the location of the parcel at time t .

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Equation 1 is solved for each constituent modeled. It is convenient to number the constituents and then all equations can be represented by a single expression of the form

$$\frac{\partial C_i}{\partial t}=\frac{\partial}{\partial \xi}\left(D\frac{\partial C_i}{\partial \xi}\right)+S_i+\Phi_i+\sum_{n=1}^{m}K_{i,n}\left(C-CR_{i,n}\right)$$ **Equation 11**

in which C_i, S_i, and Φ_i are as defined in equation 9, except that they apply to the specific constituent i. The summation term allows for the interaction between constituents where $K_{i,n}$ is the rate coefficient for the production of constituent i due to the presence of constituent n_i, and $CR_{i,n}$ is the concentration of constituent n at which the production of constituent i due to n ceases.

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Equations 9 through 11 apply only to a single fluid parcel and, therefore, do not give the variation of concentration in space and time directly. Parcels are assumed to be completely mixed, and their volume is changed only by tributary flows. The variation of concentration in a river reach is approximated by solving equation 9 for a series of parcels spaced along the river at intervals of about u(t. The concentration at any point is the concentration of the parcel at that point.

WASP5 Model

Assuming vertical and lateral homogeneity, the mass balance equation for a one-dimensional reach is:

$$\frac{\partial}{\partial t}(AC)=\frac{\partial}{\partial x}\left(-U_x AC+E_x A\frac{\partial C}{\partial x}\right)+A(S_L+S_B+S_K) \qquad \textbf{Equation 12}$$

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In this model, only the Eutrophication Chemostate Equations were used for kinetic modules. There are four interacting systems in EUTRO4: phytoplankton kinetics, the phosphorus cycle, the nitrogen cycle, and the dissolved oxygen balance.

Phytoplankton Kinetics

Three phosphorus variables are modeled: phytoplankton phosphorus, organic phosphorus, and inorganic (orthophosphate) phosphorus.

$$S_{k4j}=\left(G_{p1j}-D_{p1j}-k_{s4j}\right)P_j \qquad \textbf{Equation 13}$$

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where

Sk4j	= reaction term, cells/L-day (or mg carbon/L-day)
Pj	= phytoplankton population, cells/L (or mg carbon/L)
Gp1j	= growth rate constant, day-1
Dp1j	= depth plus respiration rate constant, day-1
ks4j	= settling rate constant, day-1
j	= segment number, unitless

The Phosphorus Cycle

Phytoplankton Phosphorus

$$\frac{\partial (C_4 a_{PC})}{\partial t} = \left(G_{p1j} - D_{p1j} - \frac{v_{s4}}{D} \right) C_4 a_{PC} \qquad \textbf{Equation 14}$$

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Organic Phosphorus

$$\frac{\partial C_8}{\partial t} = D_{p1j} C_4 a_{pc} - k_{83} \theta_{83}^{T-20} K_{mPc} C_8 - \frac{v_{s8} (1 - F_{D8})}{D} C_8 \qquad \textbf{Equation 15}$$

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Orthophosphate Phosphorus

$$\frac{\partial C_3}{\partial t} = -G_{p1j} C_4 a_{pc} + k_{83} \theta_{83}^{T-20} K_{mPc} C_4 - \frac{v_{s3} (1 - F_{D3})}{D} C_3 \qquad \textbf{Equation 16}$$

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The Nitrogen Cycle

Four nitrogen variables are modeled: phytoplankton nitrogen, organic nitrogen, ammonia, and nitrate.

Phytoplankton Nitrogen

$$\frac{\partial (C_4 a_{NC})}{\partial t} = \left(G_{p1j} - D_{p1j} - \frac{v_{s4}}{D} \right) C_4 a_{NC} \qquad \textbf{Equation 17}$$

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Organic Nitrogen

$$\frac{\partial C_7}{\partial t} = D_{p1j} C_4 a_{NC} f_{ON} - k_{71} \theta_{71}^{T-20} K_{mPc} C_7 - \frac{v_{s7}\left(1-F_{D7}\right)}{D} C_7$$

Equation 18

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Ammonia Nitrogen

$$\frac{\partial C_1}{\partial t} = k_{71} \theta_{71}^{T-20} P_{NH_3} C_7 - G_{p1j} P_{NH_3} C_4 a_{NC} - k_{12} \theta_{12}^{T-20} \left(\frac{C_6}{K_{NIT} + C_6} \right) C_1 + D_{p1j} C_4 a_{NC} \left(1 - f_{ON}\right)$$

Equation 19

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Nitrate Nitrogen

$$\frac{\partial C_2}{\partial t} = k_{12} \theta_{12}^{T-20} \left(\frac{C_6}{K_{NIT} + C_6} \right) C_1 + G_{p1j} (1 - P_{NH_3}) C_4 a_{NC} - k_{2D} \theta_{2D}^{T-20} \left(\frac{K_{NO_3 3}}{K_{NO_3} + C_6} \right) C_2$$

Equation 20

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Ammonia Preference Factor

05. Family or Relative or Friends or Other client or boarding home operator or other primary caregiver
06. Nursing home
07. Home Health or Homemaker Agency
08. Social Service Agency or mental health agency or meals on wheels
09. Church or clergy
10. Medicaid District Office
11. Your center or any center staff member actively recruited
12. Other Medical Day Care Centers
13. Community Care Program for the Elderly and Disabled (CCPED)
14. Other state offices
15. Other (specify) _____

23. **Days In attendance:** Indicate the maximum number of days/week that were approved by the Medicaid District Office for the participant to attend, as of the participant's date of enrollment.

DIAGNOSES

01. Musculoskeletal System and Connective Tissue Diseases—Includes diseases such as arthritis, Rheumatoid and allied conditions, Osteomyelitis, other diseases of joints, and Lupus.
02. Fractures—Includes all fractures, simple or compound, long or shorter term, and joint replacements.
03. Other Orthopedic—Includes such diseases as scoliosis, dislocations, sprains, congenital deformities of the bones and organs of movement, traumatic and congenital amputations of limbs, except amputation due to diabetes.
04. Diabetes—Includes diabetes and its complications such as diabetic ulcer and amputation due to diabetes.
05. Anemia
06. Nutritional and Metabolic Diseases—Includes diseases such as Addison's disease, Cushing's disease, hypothyroidism, malnutrition and obesity, but not anemia or diabetes.
07. Cancer—Includes malignant neoplasms of all sites
08. Cardiovascular—Includes disease of the heart and blood vessels such as cardiovascular-renal diseases, hypertension, arteriosclerotic heart disease, congestive heart failures, pacemaker use and other heart diseases.
09. Cerebrovascular Accidents (Stroke)
10. Traumatic brain injuries—Includes traumas with resulting brain injury, such as aneurysm, lobotomy, gunshot wounds and car accidents, among others.
11. Hearing Impaired
12. Eye disorders—Cataracts, Glaucoma, blindness, etc.
13. Cerebral Palsy
14. Multiple sclerosis
15. Neurosensory—Includes diseases such as paraplegia, quadriplegia, hemiplegia, Parkinson's disease, epilepsy, ALS, neuralgia, seizure disorders, polio, spina bifida, and spinal cord injuries, among others.
16. Alzheimer's, Organic Brain Syndrome and other dementia.
17. Mental Illness—Includes all mental illness, such as schizophrenia and depression.
18. Mental retardation—mental retardation from whatever cause, including Downs Syndrome.
19. Acquired Immune Deficiency Syndrome (AIDS) or AIDS Related Complex (ARC)
20. Gastrointestinal—Includes all non-alcohol related gastrointestinal diseases, such as ulcers, hernias, gastritis, colitis, fecal impaction; and other diseases of the buccal cavity, esophagus, stomach, intestines, peritoneum, liver (except alcohol related cirrhosis), gall bladder and pancreas.
21. Alcoholism and Alcoholism related diseases (such as cirrhosis)
22. Genitourinary—Includes all genitourinary diseases, such as infections of the kidney, ureters, bladder and urethra; prostatitis, and other diseases of the prostate or male genital organs; diseases of the breast, ovaries, fallopian tubes and other female genital organs.
23. Respiratory—Includes all respiratory diseases, such as tuberculosis, COPD, emphysema, bronchitis, and pneumonia.
24. Skin Diseases
25. General physical deterioration, frailty
26. Other (specify)

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Table 2 Phosphorus Reaction Terms

Description	Notation	Typical Value	Units
Phytoplankton	Pc		mg C/L

biomass as carbon			
Specific phytoplankton growth rate	Gp1j		day -1
Phytoplankton loss rate	Dp1j		day -1
Phosphorus to carbon ratio	apc	0.025	mg P/mg C
Dissolved organic phosphorus mineralization at 20(C	K83	0.22	day -1
Temperature coefficient	(83	1.08	none
Half saturation constant for phytoplankton limitation of phosphorus recycle	KmPc	1.0	mg C/L
Fraction of dead and respired phytoplankton recycled to the organic phosphorus pool	fop	0.5	none
recycled to the phosphate phosphorus pool	1-fop	0.5	none
Fraction dissolved inorganic phosphorus	fD3	0.85, 0.70	none
in the water column		0.70	
Fraction dissolved organic phosphorus	fD8		none
Organic matter settling velocity	vs8		m/day
Inorganic sediment settling velocity	vs3		m/day

Table 3 Nitrogen Reaction Terms

Description	Notation	Typical Value	Units
Nitrogen to carbon ratio	aNC	0.25	mg N/mg C
Organic nitrogen mineralization rate @ 20(C	k71	0.075	day -1
Nitrification rate @ 20(C	k12	0.09	day -1
Temperature coefficient for nitrification	(12	1.08	none
Half saturation constant for oxygen limitation of nitrification	KNIT	2.0	mg O2/L
Denitrification rate @ 20(C	k2D	0.09	day -1
Temperature coefficient for denitrification	(2D	1.045	none
Michaelis constant for denitrification	KNO3	0.1	mg O2/L
Fraction of dead and respired phytoplankton recycled to the organic nitrogen pool	fON	0.5	none
to the ammonia nitrogen pool	(1--fON)	0.5	none
Fraction dissolved organic nitrogen	fD7	1.0	none
Organic matter settling velocity	vs3		m/day

4.2.3.1.4 The Dissolved Oxygen Balance

Five state variables participate in the dissolved oxygen balance: phytoplankton carbon, ammonia, nitrate, carbonaceous biochemical oxygen demand, and dissolved oxygen

APPENDIX F

Type of Contact: ☐ Phone ☐ At Agency ☐ Home

NEW JERSEY EASE COMPREHENSIVE ASSESSMENT TOOL

SECTION I - INFORMATION AND ASSISTANCE *(print all information)* Client ID#: _____
SSN #:

A. CLIENT IDENTIFICATION

Name: _____ DOB: _____ Sex: ☐ F ☐ M
(Last) (First) (M)

Address: _____
(Street) (Apt #) (City) (State) (Zip Code)

Mailing Address: _____

Phone/TTY: (____) _____ Alternate/Temporary Phone: (____) _____ County Code: ____

B. INITIAL CONTACT

Made by: ☐ Client ☐ Family Member_____ ☐ Service Provider ☐ Other_____
(specify) (specify)

Name: _____ Phone: (____) _____ ____

Address: _____ ☐ Anonymity Requested

Reason for Contact: _____

_____

_____

_____

Medical Diagnosis/Disability (only if relevant):_____

1. Is abuse, neglect or exploitation alleged? ☐ Yes, discuss with supervisor and go immediately to question 6.
☐ No, continue

2. A. Information/Services Requested / B. Material Provided / C. Currently Receiving: ☐ County Resource Directory Sent

A	B	C		A	B	C		A	B	C	
☐	☐	☐	a. Adult Day Services	☐	☐	☐	h. Housing	☐	☐	☐	o. Mental Health
☐	☐	☐	b. Adult Protective Services	☐	☐	☐	i. In-Home Services	☐	☐	☐	p. Nursing Facility
☐	☐	☐	c. Alternate Family Care	☐	☐	☐	j. Living Will/Adv.Dir.	☐	☐	☐	q Nutrition Programs
☐	☐	☐	d. Assisted Living	☐	☐	☐	k. Legal Services	☐	☐	☐	.. PAAD/Lifeline
☐	☐	☐	e. Crime Prevention	☐	☐	☐	l. Long Term Care Ins.	☐	☐	☐	s. SSI/Social Security
☐	☐	☐	f. Food Stamps	☐	☐	☐	m. Medicaid	☐	☐	☐	t. Transportation
☐	☐	☐	g. Health Ins./Managed Care	☐	☐	☐	n. Medicare	☐	☐	☐	u. Other _____

3. Is caller satisfied with information only? ☐ Yes ☐ No

4. Is further assessment of client required? ☐ Yes - Go to question 5. ☐ No - Contact is complete.

5. Is caller/client willing/able to provide additional data? ☐ Yes - Go to Benefits Screening on page 3.
☐ Home visit required - Complete Home Visit Section on page 11. ☐ No - Explain in notes on page 2.

6. If immediate referral is needed, specify agency, referral date, and contact person. _____

_____

_____ _____ _____
Name of Screener Signature of Screener Date

Click here for image

APPENDIX G

A CLEANER WHIPPANY RIVER WATERSHED: NONPOINT SOURCE POLLUTION CONTROL GUIDANCE MANUAL FOR MUNICIPAL OFFICIALS, ENGINEERS AND DPW PERSONNEL

Appendix G was published separately from this amendment and is available upon request:

New Jersey Department of Environmental Protection

Division of Watershed Management

Northeast Bureau

PO Box 418

Trenton, NJ 08625-0418

(609) 633-1179

This document is also available on the following website: http://www.state.nj.us/dep/watershedmgt/northeast. . .bureau.htm